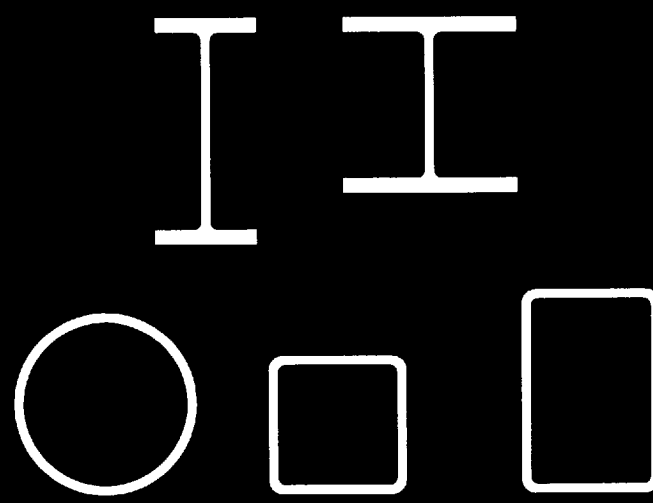
Section Properties and Member Resistances to Eurocode 3 (UB, UC and Hollow Sections)



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Section Properties and Member Resistances to Eurocode 3 (UB, UC and Hollow Sections)

Based on DD ENV 1993-1-1: 1992
Eurocode 3: Design of steel structures:
Part 1.1: General rules and rules for buildings
together with UK National Application Document

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FOREWORD

DD ENV 1993-1-1: Eurocode 3: Design of steel structures: Part 1.1 General rules and rules for buildings was published by BSI in 1992. It is the UK implementation of European Prestandard ENV 1993-1-1 (issued by CEN in 1992), together with the United Kingdom National Application Document. It is desirable that designers become familiar with all structural Eurocodes during their ENV ('draft for development') period, prior to achieving EN ('European Standard') status.

The Steel Construction Institute and other organisations are in the process of preparing design guides to assist users of the Eurocodes during the ENV period. This design guide is the first to be published on section properties and member resistances calculated according to Eurocode 3 and the additional requirements given in the UK National Application Document.

The design principles presented in this publication are applicable for construction throughout the European Economic Area (EU and EFTA), provided that the relevant National Application Document of the country of use is complied with instead of the UK NAD.

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SUMMARY

This design guide presents tables for column and beam design to *DD ENV 1993-1-1: Eurocode 3: Design of steel structures: Part 1.1 General rules and rules for buildings*, together with the United Kingdom National Application Document (UK NAD).

Design tables are presented for universal beams and universal columns to BS 4, and for structural hollow sections to BS 4848. Eurocode 3 (EC 3) section classification is given for each section and design resistances are calculated in accordance with EC 3 and the UK NAD.

Explanatory notes are presented, giving the background to the classification and the properties and resistances in the design tables.

Worked examples for a beam and a column are included, illustrating the design of typical steel sections using the design tables including the modification of values to suit the NAD of another country.

Propriétés géométriques des sections et résistances des éléments selon l'Eurocode 3 (poutres, poteaux et profils creux)

Résumé

Ce guide de dimensionnement propose des tables de dimensionnement pour les poteaux et les poutres établies sur base du DD ENV 1993-1-1: Eurocode 3: Dimensionnement des structures en acier: Partie 1.1 Règles générales et règles pour les bâtiments, et du document national d'application pour le Royaume-Uni (UK NAD).

Les tables de dimensionnement sont données pour les profils universels de poutres et poteaux repris dans la BS 4 et pour les profils creux repris dans la BS 4848. La classification selon l'Eurocode (EC3), des sections droites est donnée pour chaque profil et les résistances de dimensionnement sont calculées conformément à l'EC3 et au UK NAD.

Des notes explicatives sont donnés quant à cette classification et au calcul des résistances.

Des exemples sont données pour une poutre et pour un poteau afin d'illustrer l'usage des tables. On explique également comment utiliser les tables avec des valeurs de coefficients qui proviendraient d'autres NAD.

Querschnittswerte und Beanspruchbarkeiten nach Eurocode 3 (Doppel-T-Träger, Doppel-T-Stützen und Hohlprofile)

Zusammenfassung

Dieser Leitfaden enthält Tabellen für die Bemessung von Stützen und Trägem nach DD ENV 1993-1-1: Eurocode 3: Bemessung und Konstruktion von Stahlbauten: Teil 1-1 Allgemeine Bemessungsregein, Bemessungsregeln für den Stahlbau, in Verbindung mit dem Nationalen Anwendungsdokument für das Vereinigte Königreich (UK NAD).

Bemessungstabellen für Träger und Stützen nach BS 4 und für Hohlprofile nach BS 4848 werden vorgestellt. Die Querschnittsklasse nach Eurocode 3 (EC3) wird für jeden Querschnitt angegeben und die Beanspruchbarkeit wird nach EC3 und dem UK NAD berechnet.

In den Bemessungstabellen sind Erklärungen zu Querschnittsklasse, Querschnittswerten und Beanspruchbarkeiten zu finden.

Fallbeispiele für einen Träger und eine Stütze sind enthalten; diese erklären die Bermessung eines typischen Stahlquerschnittes mit Hilfe der Tabellen. Um die Anforderungen des Nationalen Anwendungsdokuments eines anderen Landes zu erfüllen wird die Modifikation entsprechender Werte aufgezeigt.

Proprietà delle sezioni e resistenze degli elementi secondo l'Eurocodice 3 (Profilil "Universal Beams" e "Universal Columns" a sezioni scatolari)

Sommario

Questa guida riporta tabelle progettuali per travi e colonne sviluppate secondo il "DD ENV 1993-1-1: Eurocodice 3: Progettazione di strutture in acciaio: Regole generali e regole per gli edifici" tenendo in conto il relativo documento applicativo nazionale per il Regno Unito (UK NAD).

Le tabelle progettuali sviluppate e presentate sono riferite a profili "Universal Beams" e "Universal Columns" trattati nella BS4 e a profili scatolari trattati nelle BS 4848. Il criterio di classificazione delle sezioni secondo L'Eurocodice 3 (EC3) è presentato e applicato a ogni sezione e le resistenze di progetto sono valutate in accordo all'EC3 e al relativo documento UK NAD.

Le note esplicative contenute nella pubblicazione forniscono informazioni di supporto ai dati contenuti nelle tabelle relativamente ai criteri di classificazione e alle proprietà e alle resistenze.

Le applicazioni pratiche, relative a una trave e a una colonna, illustrano l'utilizzo delle tabelle progettuali contenute nel lavoro anche nel caso in cui si faccia riferimento a documenti applicativi nazionali NAD di altri paesi.

Propiedades de las secciones y resistencias de piezas según el Eurocódigo 3 (Vigas Universales, Columnas Universales y Secciones Estructurales Huecas)

Resumen

Esta guía de proyecto incluye tablas para el proyecto de vigas y columnas según DD ENV 1993-1-1: Eurocódigo 3: Proyecto de estructuras de Acero: Parte 1.1. Reglas generales y para edificación, junto con el Documento de Aplicación Nacional del Reino Unido (UK NAD).

Las tablas se refieren a vigas y columnas universales según BS 4 y para secciones estructurales huecas según BS 4848. Para cada sección se da la clasificación según el Eurocódigo 3 (EC3) y las resistencias de proyecto se calculan de acuerdo con EC3 y el UK NAD.

Se presentan notas explicativas sobre los fundamentos de la clasificación así como de las propiedades y resistencias incluidas en las tablas.

Se incluyen ejemplos desarrollados para una viga y una columna que ilustran el proyecto de secciones típicas de acero mediante el uso de las tablas e incluyendo valores modificados que permitan cumplir con el NAD de otros paises.

"Tvärsnittsdata och Bärförmåga enligt Eurocode 3" (Standardbalkar, Standardpelare och Konstruktionsrör)

Sammanfattning

I dessa dimensioneringsanvisningar presenteras tabeller på pelare och balkar dimensionerade enligt DD ENV 1993-1-1: Eurocode 3: Design of steel structures: Part 1.1 General rules and rules for buildings, tillsammans med brittiskt Nationellt Aplikationsdokument (UK NAD).

Dimensioneringstabeller finns för standardbalkar och standardpelare enligt BS 4, samt för konstruktionsrör enligt BS 4848. Tvärsnittsklass och dimensionerande bärförmåga enligt Eurocode 3 (EC3) och UK NAD finns tabellerat.

Förklaringar som beskriver bakgrunden till klassificering, tvärsnittsdata och bärförmåga i dimensioneringstabellerna redovisas.

Genomarbetade exempel för balkar och pelare åskådliggör dimensionering av typiska ståltvärsnitt med hjälp av dimensioneringstabellerna, också med hänsyn till olika länders respektive NAD.

INTRODUCTION

This publication is a design guide to Eurocode 3: Part 1.1, as issued by CEN as a European prestandard, ENV 1993-1-1, in 1992 and amended by ENV 1993-1-1/A1 in 1994. The prestandard was published in the UK as BSI document DD ENV 1993-1-1: 1992 and this included the UK National Application Document which enables the ENV to be used for buildings constructed in the UK.

The design guide presents tables for column and beam design in a format similar to previous design guides to BS 5950: Part 1. The design tables will assist in the rapid design of steel sections under axial compression or bending. The information provided covers steel sections commonly used in the UK. The document is suitable for use with these sections in other European countries, provided that the tabulated values are modified to suit the National Application Document of the particular country, as necessary.

The symbols used in this publication are generally the same as those used in the ENV. The ENV is generally referred to in the document as 'EC3', and the UK National Application Document is referred to as the 'UK NAD'.

Worked examples for a beam and a column are presented, to illustrate the design of typical steel sections using the design tables within this publication, including the modification of the tabulated values to suit other NADs.

EXPLANATORY NOTES

1 BACKGROUND

1.1 General

This publication is a design guide to Eurocode 3: Part 1.1: April 1992, as amended December 1994. The symbols used are generally the same as those in that standard.

All references to clauses and tables in this publication relate to ENV 1993-1-1 unless otherwise stated.

1.2 Material

The structural sections referred to in this design guide are of weldable structural steels to BS EN 10025: 1993, BS EN 10113 and BS EN 10210.

The steel grades covered in the tables are S275 and S355, which are equivalent to design grades 43 and 50 of BS 5950: Part 1, (based on the former BS 4360).

Details of the corresponding grades are:

BS 5950 (Based on BS 4360)	BS EN 10025: 1990	BS EN 10025: 1993 BS EN 10113 BS EN 10210
Design grade 43	Fe 430	S 275
Design grade 50	Fe 510	S 355

1.3 Sections

The structural sections referred to in this design guide are produced to the following specifications:

Universal beams and universal columns:

BS 4: Part 1: 1993: Structural steel sections - Specification for hot rolled sections

Structural hollow sections:

BS 4848: Part 2: 1991: Hot rolled structural steel sections - Specification for hot-finished hollow sections

Some other hot-rolled hollow sections currently in regular production are also included.

1.4 Dimensional units

The dimensions of sections are given in millimetres (mm).

1.5 Property units

Generally the centimetre (cm) is used for the calculated properties, but the decimeter (dm) is used for the warping constant (I_w).

Note: 1 dm = 0.1 m = 100 mm
1 dm^6 = 1×10^{-6} m^6 = 1×10^{12} mm^6

1.6 Mass and force units

The units used are the kilogramme (kg), the newton (N) and the metre per second per second (m/s^2) so that 1 N = 1 kg × 1 m/s^2. For convenience, a standard value of the acceleration due to gravity has been generally accepted as 9.80665 m/s^2. Thus the force exerted by 1 kg under the action of gravity is 9.80665 N and the force exerted by 1 tonne (1000 kg) is 9.80665 kilonewtons (kN).

1.7 Axis convention

The axis system used in EC3 is:

x	along the member
y	Major axis, or axis perpendicular to web
z	Minor axis, or axis parallel to web.

This system is convenient for structural analysis using computer programs. However, it is different from the axis system currently in use in the UK.

2 DIMENSIONS OF SECTIONS

2.1 Masses

The masses per metre have been calculated assuming that the density of steel is 7850 kg/m^3.

In all cases, the tabulated masses are for the steel section alone and no allowance has been made for connecting material or fittings.

2.2 Ratios for local buckling

The ratios of the flange outstand to thickness (c/t_f) and the web depth to thickness (d/t_w) are given for UB and UC sections. They have been calculated using the dimensions specified in Table 5.3.1 of EC3.

2.3 EC3 classification

The Eurocode 3 classification for each section is given in the tables for both steel grade S275 and S355. The EC3 classification is given for the following load conditions:

axial compression only
bending about the y - y axis only
bending about the z - z axis only.

In each case the section is assumed to be fully loaded up to its design resistance.

According to Eurocode 3, the classification of a cross-section is based on:

a) the relevant width-to-thickness ratio for the section and
b) the position of the neutral axis, which depends upon whether the cross-section is subject to axial compression only, bending only or a combination of axial load and bending. Axial compression is the most severe case.

3 SECTION PROPERTIES

3.1 General

All section properties have been accurately calculated and rounded to three significant figures, except those above 1000 which have been rounded to four significant figures. The section properties have been calculated from the nominal metric dimensions given in the appropriate standard (see explanatory note 1.3).

3.2 UB and UC sections

3.2.1 Second moment of area (*I*)

The second moment of area of the sections, often referred to as the moment of inertia, has been calculated taking into account the root radius of the sections.

3.2.2 Radius of gyration (*i*)

The radius of gyration is a parameter used in buckling calculations and is derived as follows:

$$i = \left[\frac{I}{A}\right]^{0.5}$$

where A is the cross-sectional area.

3.2.3 Lateral-torsional buckling constants (i_{LT}, a_{LT} and a_{LT}/i_{LT})

The lateral-torsional buckling constants i_{LT} and a_{LT} needed to evaluate λ_{LT} for UB and UC sections in accordance with Annex F of EC3 are tabulated, together with the ratio a_{LT}/i_{LT}.

i_{LT} and a_{LT} have been derived as follows:

$$i_{LT} = \left[\frac{I_z I_w}{W_{pl.y}^2}\right]^{0.25}$$

$$a_{LT} = \left[\frac{I_w}{I_t}\right]^{0.5}$$

where: I_z is the second moment of area about the minor axis
I_w is the warping constant
$W_{pl.y}$ is the plastic modulus about the major axis
I_t is the torsion constant.

3.2.4 Elastic modulus (W_{el})

The elastic moduli about both principal axes are tabulated.

The elastic modulus is used to calculate the elastic moment resistance based on the design strength of the section, or the stress at the extreme fibre of the section from a known moment. It is derived as follows:

$$W_{el} = I / y$$

where y is the distance to the extreme fibre of the section from the elastic neutral axis.

3.2.5 Plastic modulus (W_{pl})

The full plastic moduli about both principal axes are tabulated.

3.2.6 Warping constant (I_w) and torsion constant (I_t)

The warping constant and torsion constant for UB and UC sections are calculated using the formulae given in the SCI publication (P057) *Design of members subject to combined bending and torsion.*

In Eurocode 3 terminology, these formulae are as follows:

$$I_w = \frac{I_z h_s^2}{4}$$

where: I_z is the second moment of area about the minor axis
h_s is the distance between shear centres of flanges (i.e. $h_s = h - t_f$).

$$I_t = \frac{2}{3} b t_f^3 + \frac{1}{3}(h - 2t_f) t_w^3 + 2\alpha_1 D_1^4 - 0.420 t_f^4$$

where: $$\alpha_1 = -0.042 + 0.2204 \frac{t_w}{t_f} + 0.1355 \frac{r}{t_f} - 0.0865 \frac{r t_w}{t_f^2} - 0.0725 \frac{t_w^2}{t_f^2}$$

$$D_1 = \frac{(t_f + r)^2 + t_w \left[r + \left(\frac{t_w}{4} \right) \right]}{2r + t_f}$$

b is the width of the section
h is the depth of the section
t_f is the flange thickness
t_w is the web thickness
r is the root radius.

3.2.7 Shear area (A_v)

The shear area of the section (A_v) for load parallel to the web as defined in clause 5.4.6 of EC3 is tabulated for UB and UC sections. This enables a more accurate value of the design plastic shear resistance $V_{pl.Rd}$ to be evaluated.

$$A_v = A - 2bt_f + (t_w + 2r)\, t_f$$

$$V_{pl.Rd} = \frac{A_v\, f_y}{\sqrt{3}\, \gamma_{M0}} = 0.55\, A_v f_y$$

where: A is the cross-section area
f_y is the nominal yield strength.

3.3 Hollow sections

3.3.1 Common properties

For second moment of area, radius of gyration, elastic modulus and plastic modulus, see explanatory notes 3.2.1, 3.2.2, 3.2.4 and 3.2.5, respectively.

For rectangular and square hollow sections the sectional properties have been calculated using the corner radii of 1.25 t externally and 1.0 t internally.

3.3.2 Torsion constant (I_t)

For circular hollow sections $I_t = 2I$

where: I is the second moment of area.

For square and rectangular hollow sections

$$I_t = \frac{t^3 p}{3} + 2k A_p$$

where: t is the thickness of the section
p is the mean perimeter $= 2\,[(b-t) + (h-t)] - 2\,R_c\,(4-\pi)$
A_p is the area enclosed by the mean perimeter $= (b-t)\,(h-t) - R_c^2\,(4-\pi)$
k $= 2A_p t / p$
b is the width of the section
h is the depth of the section
R_c is the mean of the internal and the external corner radii.

3.3.3 Torsion modulus constant (C_t)

For circular hollow sections

$C_t = 2W_{el}$

where: W_{el} is the elastic modulus.

For square and rectangular hollow sections

$C_t = I_t / (t + k/t)$

where: I_t, t and k are as defined in explanatory note 3.3.2.

4 MEMBER RESISTANCE TABLES

EC3 Ref.

4.1 General

The calculated values in the member resistance tables have been rounded to three significant figures.

4.1.1 Design strength

The member resistance tables have been based on the following nominal values of the yield strength f_y. 3.2.2.1

Nominal values of yield strength f_y and ultimate tensile strength f_u Table 3.1

Nominal steel grade to BS EN 10025: 1993 or BS EN 10113: 1993 or BS EN 10210-1: 1994	Nominal thickness of element t (mm)			
	$t \le 40$ mm		40 mm $< t \le$ 100 mm	
	f_y (N/mm^2)	f_u (N/mm^2)	f_y (N/mm^2)	f_u (N/mm^2)
S275	275	430	255	410
S355	355	510	335	490

4.2 Compression members: UB, UC and hollow sections subject to axial compression

5.4.4
5.5.1

Values are given for the design compression resistance of the cross-section $N_{c.Rd}$. 5.4.4.(2)

The values of design buckling resistance $N_{b.Rd}$ of compression members are tabulated for the buckling lengths given at the head of the table. The values for $N_{c.Rd}$ and $N_{b.Rd}$ conform to the requirements of the UK NAD. 5.5.1.1 NAD 6.1.3

For other European countries, the design cross-section and buckling resistance can be calculated from:

$$(N_{c.Rd})_{country} = (N_{c.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$ for class 1, 2 & 3 cross-sections

$$(N_{c.Rd})_{country} = (N_{c.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$ for class 4 cross-sections

$$(N_{b.Rd})_{country} = (N_{b.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$ for all cross-sections

where: $(N_{c.Rd})_{UK}$ is the tabulated value for $N_{c.Rd}$
$(N_{b.Rd})_{UK}$ is the tabulated value for $N_{b.Rd}$
$(\gamma_{M0})_{country}$ is the factor from the NAD of the appropriate country
$(\gamma_{M1})_{country}$ is the factor from the NAD for the appropriate country.

Note:					
	$(\gamma_{M0})_{UK}$	=	1.05	(from UK NAD)	UK NAD Table 1
	$(\gamma_{M1})_{UK}$	=	1.05	(from UK NAD)	
	$(\gamma_{M0})_{EC3}$	=	1.1	(boxed EC3 value)	5.1.1
	$(\gamma_{M1})_{EC3}$	=	1.1	(boxed EC3 value)	5.1.1

4.3 Bending: UB and UC sections subjected to bending 5.4.5

Values are given for the design moment resistance of cross-section $M_{c.Rd}$. 5.4.5.2

The values of the design buckling resistance moment $M_{b.Rd}$ of laterally unrestrained beams are tabulated for: 5.5.2

(a) The spacing between lateral restraints given at the head of the table.
(b) Slenderness correction factor η taken as 1.0, 0.8, 0.6 and 0.4.

These values for $M_{c.Rd}$ and $M_{b.Rd}$ conform to the requirements of the UK NAD. NAD 6.1.3

For other European countries, the design cross-section and buckling moment resistance can be calculated from:

$$(M_{c.Rd})_{country} = (M_{c.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$ for Class 1, 2 & 3 cross-sections

$$(M_{c.Rd})_{country} = (M_{c.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$ for Class 4 cross-sections

$$(M_{b.Rd})_{country} = (M_{b.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$ for all cross-sections

where: $(M_{c.Rd})_{UK}$ is the tabulated value for $M_{c.Rd}$
$(M_{b.Rd})_{UK}$ is the tabulated value of $M_{b.Rd}$
$(\gamma_{M0})_{country}$ is the factor from the NAD of the appropriate country
$(\gamma_{M1})_{country}$ is the factor from the NAD of the appropriate country

Note:					
	$(\gamma_{M0})_{UK}$	= 1.05	(from UK NAD)	UK NAD
	$(\gamma_{M1})_{UK}$	= 1.05	(from UK NAD)	Table 1
	$(\gamma_{M0})_{EC3}$	= 1.1	(EC3 boxed value)	5.1.1
	$(\gamma_{M1})_{EC3}$	= 1.1	(EC3 boxed value)	5.1.1

The slenderness correction factor, η is given by: $\eta = (k / C_1)^{0.5}$

where: $k = \ell / L$ (Effective length factor) Tables
C_1 is the factor to allow for the shape of bending moment diagram. Values of C_1 are given in EC3: Part 1.1. F.1.1/F.1.2

η is required for the calculation of the geometrical slenderness ratio λ_{LT} as given by the expression (F.23) of EC3: Part 1.1.

$$\lambda_{LT} = \frac{kL / i_{LT}}{(C_1)^{0.5}\left[\left[\frac{k}{k_w}\right]^2 + \frac{(kL / a_{LT})^2}{25.66}\right]^{0.25}}$$ Eq. F.23

for the usual condition of no special provision for warping fixity, $k_w = 1.0$

$$\therefore \lambda_{LT} = \frac{\eta L / i_{LT}}{\left[1 + \frac{(L / a_{LT})^2}{25.66}\right]^{0.25}}$$

4.4 Bending: Structural hollow sections subject to bending

5.4.5
5.5.2

4.4.1 Circular and square hollow sections

Values are given for the design moment resistance of the cross-section $M_{c.Rd}$. 5.4.5.2

For circular and square hollow sections, there is no possibility of lateral torsional buckling, hence $M_{b.Rd} = M_{c.Rd}$.

These values for $M_{c.Rd}$ conform to the requirements of the UK NAD. NAD 6.1.3

For other European countries, the design moment resistance of the cross-section can be calculated from:

$$(M_{c.Rd})_{country} = (M_{c.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}} \quad \text{for Class 1, 2 \& 3 cross-sections}$$

$$(M_{c.Rd})_{country} = (M_{c.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}} \quad \text{for Class 4 cross-sections}$$

where: $(M_{c.Rd})_{UK}$ is the tabulated value for $M_{c.Rd}$
$(\gamma_{M0})_{country}$ is the factor from the NAD of the appropriate country
$(\gamma_{M1})_{country}$ is the factor from the NAD of the appropriate country

Note:					
	$(\gamma_{M0})_{UK}$	=	1.05	(from UK NAD)	UK NAD Table 1
	$(\gamma_{M1})_{UK}$	=	1.05	(from UK NAD)	5.1.1
	$(\gamma_{M0)EC3}$	=	1.1	(EC3 boxed value)	5.1.1
	$(\gamma_{M1)EC3}$	=	1.1	(EC3 boxed value)	

4.4.2 Rectangular hollow sections

The values of design moment resistance of the cross-section $M_{c.Rd}$ are tabulated. These values conform to the requirements of the UK NAD. For design for other European countries, see explanatory note 4.4.1. 5.4.5.2

The limiting length L_c given in the table is the length above which lateral-torsional buckling should be checked, and is given by: 5.5.2

$$L_c = \frac{(0.4)^2 \pi}{\beta_w W_{pl.y} f_y} \left[\frac{E I_z G I_t}{\left(1 - \frac{I_z}{I_y}\right)\left(1 - \frac{G I_t}{E I_y}\right)} \right]^{0.5} \qquad \text{Equation A}$$

L_c has been derived as the value which gives $\bar{\lambda}_{LT} = 0.4$ 5.5.2(7)

$\bar{\lambda}_{LT}$ is given by:

$$\bar{\lambda}_{LT} = \left[\frac{\lambda_{LT}}{\lambda_1}\right][\beta_w]^{0.5}$$ 5.5.2(5) & Eq. F.12

Equation A has been derived as follows:

Substituting for $\bar{\lambda}_{LT} = 0.4$ and rearranging yields

$$\lambda_{LT} = \frac{0.4\,\lambda_1}{[\beta_w]^{0.5}}$$ Equation B

where: $\lambda_1 = \pi\left(\frac{E}{f_y}\right)^{0.5}$ F2.1(1)

EC3 does not give λ_{LT} for RHS sections. However, from BS 5950: Part 1:

$\lambda_{LT} = n\ 2.25\ (\phi_b\ \lambda)^{0.5}$ BS 5950: Pt 1 B2.6.1

in which the constant 2.25 represents $\left[\pi\sqrt{\frac{E}{G}}\right]^{0.5}$

Using EC3 symbols, for the case n = 1 this becomes:

$$\lambda_{LT} = \left[\pi\sqrt{\frac{E}{G}}\right]^{0.5}(\phi_b\,\lambda)^{0.5}$$

where: $\phi_b = \left(\frac{W_{pl.y}{}^2\,\gamma'}{A\,I_t}\right)^{0.5}$

$$\gamma' = \left(1-\frac{I_z}{I_y}\right)\left(1-\frac{G\,I_t}{E\,I_y}\right)$$

$$\lambda = \frac{L_c}{i_z}$$

E is the modulus of elasticity
G is the shear modulus = E/2.6
I_y is the second moment of area about the major axis
I_z is the second moment of area about the minor axis
I_t is the torsion constant
i_z is the radius of gyration about the minor axis.

Substituting for λ_{LT} into Equation B and solving for L_c yields Equation A.

5 USE OF DESIGN TABLES

(Illustrated by Worked Examples)

The following examples illustrate how the design tables can be used by the designer to select the initial size of the steel section required for a typical beam and column design. Additional checks will be necessary for final design in the UK and other European countries.

It should be understood that the γ_{M0} and γ_{M1} values for "Other European Country" are arbitrary values that have been selected to illustrate the procedure. They are not intended to be typical or to represent any specific country.

References in the right hand margin refer to EC3 unless otherwise stated.

Note: Linear interpolation can be used between the tabulated values.

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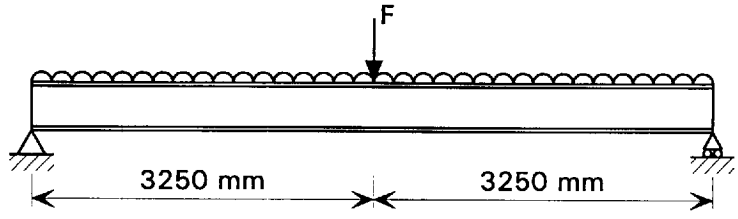
EXAMPLE 1: LATERALLY RESTRAINED BEAM

The beam, shown in the figure below, is fully laterally restrained along its length. For the loading given, select a suitable UB section in steel grade S275 from the design tables for:

(1) UK design
(2) Other European country



Basic requirement to be satisfied for bending about the major (y-y) axis is:

$M_{y.Sd} \leq M_{c.y.Rd}$ ***(resistance of cross section)*** — *5.4.5*

$M_{y.Sd}$ ***is the design moment***

$M_{c.y.Rd}$ ***is the design moment resistance of the cross-section (about the y-y axis), to be determined from the design tables.***

Note: ***When subject to bending, none of the UB sections in steel grade S275 and S355 is classified as Class 4.*** — *Page 32, 34 (DesignTables)*

Therefore, in this example no further reference is made to Class 4 cross-sections.

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1. UK DESIGN

EC3: Part 1.1 UK NAD Table 1

Partial safety factors from UK NAD

For permanent actions $\gamma_G = 1.35$
For variable actions $\gamma_Q = 1.5$
For cross-section resistance $\gamma_{M0} = 1.05$ *(Class 1, 2 or 3 cross-sections)*

Action (Loading)

	Unfactored		*Factored*		*Design values*
	Permanent action	*Variable action*	*Permanent action*	*Variable action*	
Distributed load (kN/m)	*15*	*30*	*20.25*	*45*	*65.25*
Point load (kN)	*40*	*50*	*54*	*75*	*129*

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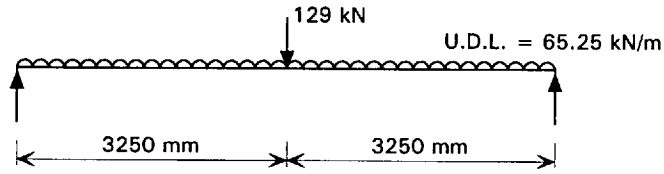
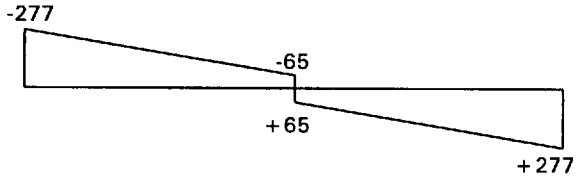
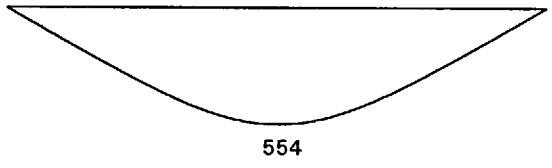
Design values at ULS



Shear force diagram (kN)



Bending moment diagram (kNm)



Design moment $M_{y.Sd}$ = 554 kNm

From design tables (EC3 UK NAD):

Select 533 × 210 × 92 UB steel grade S275

$M_{c.y.Rd}$ = *618 kNm*

Page 74 (Design Tables)

Since 554 < 618 ∴ resistance of cross-section is OK

∴ 533 × 210 × 92 UB steel grade S275 is OK for UK NAD design

For final design, additional checks would be required for shear, web crushing, web crippling and deflection.

2. *OTHER EUROPEAN COUNTRY*

$$(M_{c.y.Rd})_{country} = (M_{c.y.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$ *for Class 1, 2 & 3 cross-sections*

Assuming : $(M_{y.Sd})_{country} = 554$ kNm *(as before)* *)

$(\gamma_{M0})_{country} = 1.20$

Try 533 × 210 × 92 UB steel grade S275 (Class 1 cross-section)

$(M_{c.y.Rd})_{UK} = 618$ kNm *(as before)* — *Page 74 (Design Tables)*

$\therefore (M_{c.y.Rd})_{country} = 618 \times \frac{1.05}{1.20} = 541$ kNm

Since 554 ≮ 541

$\therefore$ *533 × 210 × 92 UB steel grade S275 is not suitable.*

Try 533 × 210 × 101 UB steel grade S275 (Class 1 cross-section)

From design tables (EC3 UK NAD):

$(M_{c.y.Rd})_{UK} = 684$ kNm — *Page 74 (Design Tables)*

$\therefore (M_{c.y.Rd})_{country} = 684 \times \frac{1.05}{1.20} = 599$ kNm

Since 554 < 599 $\therefore$ *resistance of cross-section is OK*

∴ 533 × 210 × 101 UB steel grade S275 is OK for "Other European Country" design.

*) *This is true for most countries, but in some cases the NAD also introduces different γ_F factors.*

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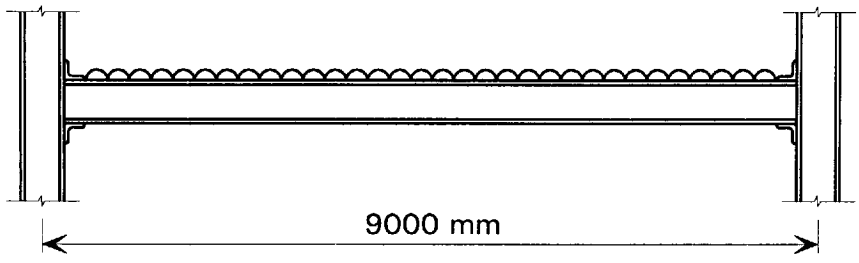
EXAMPLE 2: BEAM UNRESTRAINED BETWEEN SUPPORTS

The figure below shows a beam laterally restrained at the ends only. For the loading shown, select a suitable UB section in steel grade S275 from the design tables for:

(1) UK design
(2) Other European country



Basic requirements to be satisfied for bending about the major axis (y-y) axis are:

$M_{y.Sd} \leq M_{c.y.Rd}$ ***(resistance of cross-section)*** — *5.4.5*

$M_{y.Sd} \leq M_{b.Rd}$ ***(resistance to lateral-torsional buckling i.e. LTB)*** — *5.5.2*

$M_{y.Sd}$ ***is the design moment***

$M_{c.y.Rd}$ ***is the design moment resistance of the cross-section (about the y-y axis)***

$M_{b.Rd}$ ***is the design buckling resistance moment of the laterally unrestrained beam***

Note: ***When subject to bending, none of the UB sections in steel grade S275 and S355 is classified as Class 4.*** — *Page 32, 34 (Design Tables)*

Therefore, in this example no further reference is made to Class 4 cross-sections.

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1. UK DESIGN

Partial Safety Factor from UK NAD — *EC3: Part 1.1 UK NAD Table 1*

For permanent actions	γ_G	=	*1.35*
For variable actions	γ_Q	=	*1.5*
For cross-section resistance	γ_{M0}	=	*1.05*
For buckling resistance	γ_{M1}	=	*1.05*

Action (Loading)

	Unfactored		*Factored*		*Design value*
	Permanent action	*Variable action*	*Permanent action*	*Variable action*	
Distributed load (kNm)	*18*	*30*	*24.3*	*45*	*69.3*

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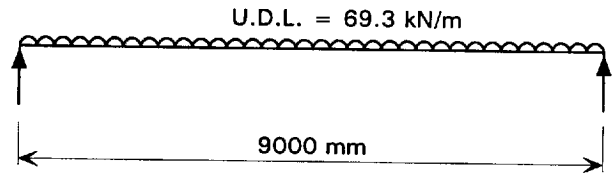
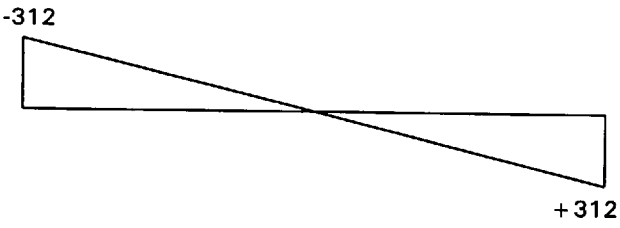
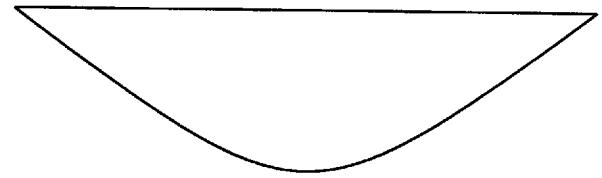
Design values at ULS



Shear force diagram (kN)



Bending moment diagram (kNm)



Design Moment $M_{y.Sd}$ = 702 kNm

Select Suitable Section from the Tables

Data needed to select a section:

Maximum design moment $M_{y.Sd}$ = *702 kNm*

Spacing between lateral restraints = *9.0 m*

Slenderness correction factor η = $\left(\frac{k}{C_1}\right)^{0.5}$

For effective length factor k, UK NAD refers to BS 5950: Part 1 (Clause 4.3.5).

For the loading and support condition.

k = *1.0* *(i.e. both flanges free to rotate on plan)*

Hence C_1 = *1.132* — *EC3 Part 1.1 Table F.1.2*

$$\therefore \eta = \left(\frac{1.0}{1.132}\right)^{0.5} = 0.94$$

From design tables (EC3 UK NAD):

Select 610 × 305 × 149 UB steel grade S275 *(Class 1 cross-section)*

$M_{c.y.Rd}$ = *1200 kNm* — *Page 76 (Design Tables)*

$M_{b.Rd}$ = *727 kNm (interpolating for* η = *0.94 and 9 m spacing)*

Since 702 < 1200 ∴ *resistance of cross-section is OK*

Since 702 < 727 ∴ *resistance to LTB is OK*

∴ 610 × 305 × 149 UB steel grade S275 is OK for UK NAD design

For final design, additional checks would be required for shear, web crushing, web crippling and deflection.

2. *OTHER EUROPEAN COUNTRY*

$$(M_{c.y.Rd})_{country} = (M_{c.y.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$

$$(M_{b.Rd})_{country} = (M_{b.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$

Assuming: $(M_{y.Sd})_{country} = 702$ kN *(as before)* *)

$(\gamma_{M0})_{country} = 1.20$

$(\gamma_{M1})_{country} = 1.25$

Try 610 × 305 × 149 UB steel grade S275 (as before)

Page 76 (Design Tables)

$$\therefore (M_{c.y.Rd})_{country} = 1200 \times \frac{1.05}{1.20} = 1050 \text{ kNm}$$

$$\therefore (M_{b.Rd})_{country} = 727 \times \frac{1.05}{1.25} = 611 \text{ kNm}$$

Since 702 ≮ 611

∴ 610 × 305 × 149 UB steel grade S275 is not suitable.

Try 610 × 305 × 179 UB steel grade S275

$(M_{b.Rd})_{UK} = 927$ kNm *(interpolating for $\eta = 0.94$ and 9 m spacing)*

Page 76 (Design Tables)

$$\therefore (M_{b.Rd})_{country} = 927 \times \frac{1.05}{1.25} = 779 \text{ kNm}$$

Since 702 < 779 *∴ resistance to LTB is OK*

∴ 610 × 305 × 179 UB steel grade S275 is OK for "Other European Country" design

For final design, additional checks would be required for shear, web crushing, web crippling and deflection.

*) *This is true for most countries, but in some cases the NAD also introduces different γ_F factors.*

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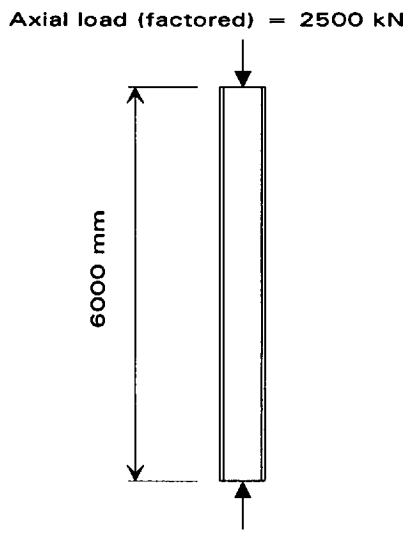
EXAMPLE 3: AXIALLY LOADED COLUMN WITH PINNED ENDS

Using the design tables, select a suitable UC, CHS and square hollow section in steel grade S275 for the details given below for:

(1) UK design
(2) Other European country



Basic requirements to be satisfied for compression members are:

$N_{Sd} \leq N_{c.Rd}$ ***(resistance of cross-section)*** — *5.4.4*

$N_{Sd} \leq N_{b.Rd}$ ***(resistance to buckling of the member)*** — *5.5.1*

N_{Sd} ***is the design axial compressive force***

$N_{c.Rd}$ ***is the design compression resistance of the cross-section***

$N_{b.Rd}$ ***is the design buckling resistance of the compression member***

Note: ***When subject to axial compression, none of the UC and CHS sections in steel grade S275 and S355 is classified as Class 4. Some square hollow sections are classified as Class 4 cross-sections. However, in this example it is assumed that a "Class 4" section will not be adopted and therefore no further reference is made to Class 4 cross-sections.***

(Design Tables) Page 36,38-40 Page 41-43

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1. UK DESIGN

N_{sd} = *2500 kN* *buckling length of 6.0 m*

"UC Section"

Select 356 × 368 × 129 UC steel grade S275

$N_{c.Rd}$ = *4300 kN*
$N_{b.y.Rd}$ = *3910 kN* *Page 55 (Design Tables)*
$N_{b.z.Rd}$ = *3030 kN*

Since 2500 < 4300 *∴ resistance of cross-section is OK*
Since 2500 < 3910 and 3030 *∴ resistance to buckling is OK*

∴ 356 × 368 × 129 UC steel grade S275 is OK for UK NAD design

"CHS"

Select 355.6 × 10 @ 85.2 kg/m CHS steel grade S275

$N_{c.Rd}$ = *2840 kN*
$N_{b.Rd}$ = *2570 kN* *Page 58 (Design Tables)*

Since 2500 < 2840 *∴ resistance of cross section is OK*
Since 2500 < 2570 *∴ resistance to buckling OK*

∴ 355.6 × 10 @ 85.2 kg/m CHS steel grade S275 is OK for UK NAD design

"SHS"

Select 300 × 300 × 10 @ 90.7 kg/m SHS steel grade S275

$N_{c.Rd}$ = *3030 kN*
$N_{b.Rd}$ = *2710 kN* *Page 61 (Design Tables)*

Since 2500 < 3030 *∴ resistance of cross section is OK*
Since 2500 < 2710 *∴ resistance to buckling is OK*

∴ 300 × 300 × 10 @ 90.7 kg/m SHS steel grade S275 is OK for UK NAD design

2. *OTHER EUROPEAN COUNTRY*

$$(N_{c.Rd})_{country} = (N_{c.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$

$$(N_{b.Rd})_{country} = (N_{b.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$

Assuming: $(N_{Sd})_{country} = 2500\ kN$ *(as before)* *)

$(\gamma_{M0})_{country} = 1.20$

$(\gamma_{M1})_{country} = 1.25$

Buckling length $= 6.0\ m$

"UC Section"

Select 356 × 368 × 129 UC steel grade S275

Page 55 (Design Tables)

$$\therefore (N_{c.Rd})_{country} = 4300 \times \frac{1.05}{1.20} = 3763\ kN$$

$$\therefore (N_{b.y.Rd})_{country} = 3910 \times \frac{1.05}{1.25} = 3284\ kN$$

$$\therefore (N_{b.z.Rd})_{country} = 3030 \times \frac{1.05}{1.25} = 2545\ kN$$

Since 2500 < 3763 ∴ *resistance of cross-section is OK*

Since 2500 < 3284 and 2545 ∴ *resistance to buckling is OK*

∴ 356 × 368 × 129 UC steel grade S275 is OK for "Other European Country" design

*) *This is true for most countries, but in some cases the NAD also introduces different* γ_F *factors.*

"CHS"

Try 355.6 × 12.5 @ 106 kg/m CHS steel grade S275

$(N_{c.Rd})_{UK} = 3530\ kN$

$\therefore (N_{c.Rd})_{country} = 3530 \times \frac{1.05}{1.20} = 3089\ kN$

Page 58 (Design Tables)

$(N_{b.Rd})_{UK} = 3180\ kN$

$\therefore (N_{b.Rd})_{country} = 3180 \times \frac{1.05}{1.25} = 2671\ kN$

Since 2500 < 3089 ∴ *resistance of cross-section is OK*

Since 2500 < 2671 ∴ *resistance to buckling is OK*

∴ 355.6 × 12.5 @ 106 kg/m CHS steel grade S275 is OK for "Other European Country" design

"SHS"

Try 300 × 300 × 12.5 @ 112 kg/m SHS steel grade S275

$(N_{c.Rd})_{UK} = 3750\ kN$

$\therefore (N_{c.Rd})_{country} = 3750 \times \frac{1.05}{1.20} = 3281\ kN$

Page 61 (Design Tables)

$(N_{b.Rd})_{UK} = 3350\ kN$

$\therefore (N_{b.Rd})_{country} = 3350 \times \frac{1.05}{1.25} = 2814\ kN$

Since 2500 < 3281 ∴ *resistance of cross-section is OK*

Since 2500 < 2814 ∴ *resistance to buckling is OK*

∴ 300 × 3005 × 12.5 @ 112 kg/m SHS steel grade S275 is OK for "Other European Country" design

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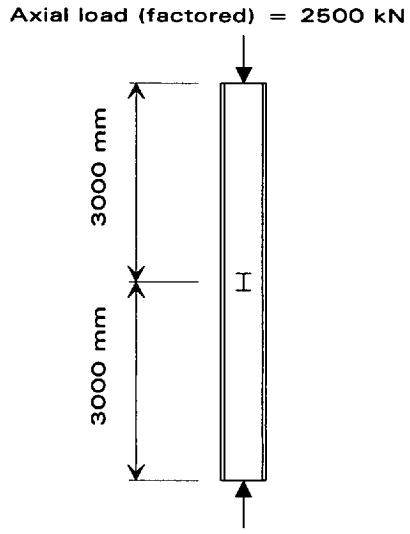
CALCULATION SHEET

Job No.	CDS 115	Page	1 of 4	Rev.	0
Job Title	*Use of EC3 Design Tables*				
Subject	*Example 4 - Column with Tie at Mid-height*				
Client		Made by	*ASM*	Date	*Sept 1996*
		Checked by	*JCT*	Date	*Oct 1996*

EXAMPLE 4: PIN ENDED COLUMN WITH TIE AT MID-HEIGHT

Using the design tables, select a suitable UC and rectangular hollow section in steel grade S275, for the details given below for:

(1) UK design
(2) Other European country



Basic requirements to be satisfied for compression members are:

$N_{Sd} \leq N_{c.Rd}$ *(resistance of cross-section)* — *5.4.4*

$N_{Sd} \leq N_{b.Rd}$ *(resistance to buckling of the member)* — *5.5.1*

N_{Sd} *is the design axial compressive force*

$N_{c.Rd}$ *is the design compression resistance of the cross-section*

$N_{b.Rd}$ *is the design buckling resistance of the compression member*

Note: When subject to axial compression, none of the UC sections in steel grade S275 and S355 is classified as Class 4. — *(Design Tables) Page 36*
Some rectangular hollow sections are classified as Class 4 cross-sections. — *Page 44-47*
However, in this example it is assumed that a "Class 4" section will not be adopted and therefore no further reference is made to Class 4 cross-sections.

1. UK DESIGN

N_{Sd} = *2500 kN*

"UC Section"

Select 305 × 305 × 97 UC steel grade S275

$N_{c.Rd}$ = *3230 kN*

Page 55 (Design Tables)

For buckling length of 6.0 m (about y-y axis):

$N_{b.y.Rd}$ = *2840 kN*

For buckling length of 3.0 m (about z-z axis):

$N_{b.z.Rd}$ = *2820 kN*

Since 2500 < 3230 ∴ *resistance of cross-section is OK*
Since 2500 < 2840 and 2820 ∴ *resistance to buckling is OK*

∴ *305 × 305 × 97 UC steel grade S275 is OK for UK NAD design*

"RHS"

Select 350 × 250 × 10 @ 90.7 kg/m RHS steel grade S275

$N_{c.Rd}$ = *3030 kN*

Page 67 (Design Tables)

For buckling length of 6.0 m (about y-y axis):

$N_{b.y.Rd}$ = *2780 kN*

For buckling length of 3.0 m (about z-z axis):

$N_{b.z.Rd}$ = *2930 kN*

Since 2500 < 3030 ∴ *resistance of cross-section is OK*
Since 2500 < 2780 and 2930 ∴ *resistance to buckling is OK*

∴ *350 × 250 × 10 @ 90.7 kg/m RHS steel grade S275 is OK for UK NAD design*

2. *OTHER EUROPEAN COUNTRY*

$$(N_{c.Rd})_{country} = (N_{c.Rd})_{UK} \times \frac{(\gamma_{M0})_{UK}}{(\gamma_{M0})_{country}}$$

$$(N_{b.Rd})_{country} = (N_{b.Rd})_{UK} \times \frac{(\gamma_{M1})_{UK}}{(\gamma_{M1})_{country}}$$

$(\gamma_{M0})_{UK} = 1.05$

$(\gamma_{M1})_{UK} = 1.05$

Assuming: $(N_{sd})_{country} = 2500$ kN *(as before)* *)

$(\gamma_{M0})_{country} = 1.20$

$(\gamma_{M1})_{country} = 1.25$

*) *This is true for most countries, but in some cases the NAD also introduces different γ_F factors.*

"UC Section"

Try 305 × 305 × 118 UC steel grade S275

$(N_{c.Rd})_{UK} = 3930$ kN

Page 55 (Design Tables)

$\therefore (N_{c.Rd})_{country} = 3930 \times \frac{1.05}{1.20} = 3439$ kN

For buckling length of 6.0 m (about y-y axis):

$(N_{b.y.Rd})_{UK} = 3460$ kN

$\therefore (N_{b.y.Rd})_{country} = 3460 \times \frac{1.05}{1.25} = 2906$ kN

For buckling length of 3.0 m (about z-z axis):

$(N_{b.z.Rd})_{UK} = 3440$ kN

$\therefore (N_{b.z.Rd})_{country} = 3440 \times \frac{1.05}{1.25} = 2890$ kN

Since 2500 < 3439 ∴ *resistance of cross-section is OK*

Since 2500 < 2906 and 2890 ∴ *resistance to buckling is OK*

∴ 305 × 305 × 118 UC steel grade S275 is OK for "Other European Country" design

"RHS"

Try 350 × 250 × 12.5 @ 112 kg/m RHS steel grade S275

$(N_{c.Rd})_{UK} = 3750\ kN$

Page 67 (Design Tables)

$\therefore\ (N_{c.Rd})_{country} = 3750 \times \frac{105}{120} = 3281\ kN$

For buckling length of 6.0 m (about y-y axis):

$(N_{b.y.Rd})_{UK} = 3430\ kN$

$\therefore\ (N_{b.y.Rd})_{country} = 3430 \times \frac{1.05}{1.25} = 2881\ kN$

For buckling length of 3.0 m (about z-z axis):

$(N_{b.z.Rd})_{UK} = 3620\ kN$

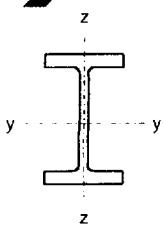
$\therefore\ (N_{b.z.Rd})_{country} = 3620 \times \frac{1.05}{1.25} = 3041\ kN$

Since 2500 < 3281 ∴ *resistance of cross-section is OK*

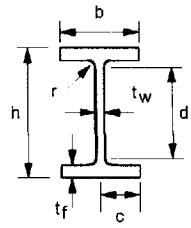
Since 2500 < 2881 and 3041 ∴ *resistance to buckling is OK*

∴ 305 × 250 × 12.5 @ 112 kg/m RHS steel grade S275 is OK for "Other European Country" design

Tables of dimensions and section properties



UNIVERSAL BEAMS



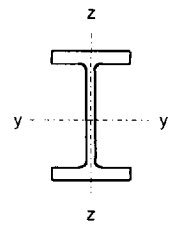
DIMENSIONS AND EC 3 CLASSIFICATION

Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		EC 3 Classification					
										S 275			S 355		
				Web	Flange			Flange	Web	Comp only	Bending only		Comp only	Bending only	
		h	b	t_w	t_f	r	d	c / t_f	d / t_w		y - y	z - z		y - y	z - z
	kg/m	mm	mm	mm	mm	mm	mm								
127x76x13	13.0	127.0	76.0	4.0	7.6	7.6	96.6	5.00	24.1	1	1	1	1	1	1
152x89x16	16.0	152.4	88.7	4.5	7.7	7.6	121.8	5.76	27.1	1	1	1	2	1	1
178x102x19	19.0	177.8	101.2	4.8	7.9	7.6	146.8	6.41	30.6	2	1	1	2	1	1
203x102x23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	5.47	31.4	2	1	1	3	1	1
203x133x25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	8.54	30.2	1	1	1	2	2	2
203x133x30	30.0	206.8	133.9	6.4	9.6	7.6	172.4	6.97	26.9	1	1	1	2	1	1
254x102x22	22.0	254.0	101.6	5.7	6.8	7.6	225.2	7.47	39.5	4	1	1	4	1	1
254x102x25	25.2	257.2	101.9	6.0	8.4	7.6	225.2	6.07	37.5	3	1	1	4	1	1
254x102x28	28.3	260.4	102.2	6.3	10.0	7.6	225.2	5.11	35.7	3	1	1	4	1	1
254x146x31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	8.49	36.5	3	1	1	4	2	2
254x146x37	37.0	256.0	146.4	6.3	10.9	7.6	219.0	6.72	34.8	2	1	1	4	1	1
254x146x43	43.0	259.6	147.3	7.2	12.7	7.6	219.0	5.80	30.4	1	1	1	2	1	1
305x102x25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	7.26	47.6	4	1	1	4	1	1
305x102x28	28.2	308.7	101.8	6.0	8.8	7.6	275.9	5.78	46.0	4	1	1	4	1	1
305x102x33	32.8	312.7	102.4	6.6	10.8	7.6	275.9	4.74	41.8	4	1	1	4	1	1
305x127x37	37.0	304.4	123.4	7.1	10.7	8.9	265.2	5.77	37.4	3	1	1	4	1	1
305x127x42	41.9	307.2	124.3	8.0	12.1	8.9	265.2	5.14	33.2	2	1	1	3	1	1
305x127x48	48.1	311.0	125.3	9.0	14.0	8.9	265.2	4.47	29.5	1	1	1	2	1	1
305x165x40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	8.09	44.2	4	1	1	4	1	1
305x165x46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	7.02	39.6	4	1	1	4	1	1
305x165x54	54.0	310.4	166.9	7.9	13.7	8.9	265.2	6.09	33.6	2	1	1	3	1	1
356x127x33	33.1	349.0	125.4	6.0	8.5	10.2	311.6	7.38	51.9	4	1	1	4	1	1
356x127x39	39.1	353.4	126.0	6.6	10.7	10.2	311.6	5.89	47.2	4	1	1	4	1	1
356x171x45	45.0	351.4	171.1	7.0	9.7	10.2	311.6	8.82	44.5	4	1	1	4	2	2
356x171x51	51.0	355.0	171.5	7.4	11.5	10.2	311.6	7.46	42.1	4	1	1	4	1	1
356x171x57	57.0	358.0	172.2	8.1	13.0	10.2	311.6	6.62	38.5	3	1	1	4	1	1
356x171x67	67.1	363.4	173.2	9.1	15.7	10.2	311.6	5.52	34.2	2	1	1	4	1	1
406x140x39	39.0	398.0	141.8	6.4	8.6	10.2	360.4	8.24	56.3	4	1	1	4	2	2
406x140x46	46.0	403.2	142.2	6.8	11.2	10.2	360.4	6.35	53.0	4	1	1	4	1	1
406x178x54	54.1	402.6	177.7	7.7	10.9	10.2	360.4	8.15	46.8	4	1	1	4	2	2
406x178x60	60.1	406.4	177.9	7.9	12.8	10.2	360.4	6.95	45.6	4	1	1	4	1	1
406x178x67	67.1	409.4	178.8	8.8	14.3	10.2	360.4	6.25	41.0	4	1	1	4	1	1
406x178x74	74.2	412.8	179.5	9.5	16.0	10.2	360.4	5.61	37.9	3	1	1	4	1	1

y - y is the major axis and z - z is the minor axis.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 2.

UNIVERSAL BEAMS



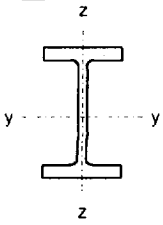
PROPERTIES

Section Designation	Second Moment of Area		Radius of Gyration		Lateral-torsional Buckling Constants (1)			Elastic Modulus		Plastic Modulus		Warping Constant	Torsion Constant	Area of Section	Shear Area
	Axis y - y I_y cm^4	Axis z - z I_z cm^4	Axis y - y i_y cm	Axis z - z i_z cm	i_{LT} cm	a_{LT} cm	Ratio a_{LT}/i_{LT}	Axis y - y $W_{el,y}$ cm^3	Axis z - z $W_{el,z}$ cm^3	Axis y - y $W_{pl,y}$ cm^3	Axis z - z $W_{pl,z}$ cm^3	I_w dm^6	I_t cm^4	A cm^2	A_v cm^2
127x76x13	473	55.7	5.35	1.84	1.99	26.4	13.3	74.6	14.7	84.2	22.6	0.00199	2.85	16.5	6.43
152x89x16	834	89.8	6.41	2.10	2.30	36.3	15.8	109	20.2	123	31.2	0.00470	3.56	20.3	8.18
178x102x19	1356	137	7.48	2.37	2.60	47.3	18.2	153	27.0	171	41.6	0.00987	4.41	24.3	9.85
203x102x23	2105	164	8.46	2.36	2.61	46.8	18.0	207	32.2	234	49.8	0.0154	7.02	29.4	12.4
203x133x25	2340	308	8.56	3.10	3.41	70.2	20.5	230	46.2	258	70.9	0.0294	5.96	32.0	12.8
203x133x30	2896	385	8.71	3.17	3.47	60.2	17.3	280	57.5	314	88.2	0.0374	10.3	38.2	14.6
254x102x22	2841	119	10.1	2.06	2.39	66.3	27.8	224	23.5	259	37.3	0.0182	4.15	28.0	15.6
254x102x25	3415	149	10.3	2.15	2.46	59.9	24.3	266	29.2	306	46.0	0.0230	6.42	32.0	16.7
254x102x28	4005	179	10.5	2.22	2.52	54.1	21.5	308	34.9	353	54.8	0.0280	9.57	36.1	17.8
254x146x31	4413	448	10.5	3.36	3.72	87.8	23.6	351	61.3	393	94.1	0.0660	8.55	39.7	16.4
254x146x37	5537	571	10.8	3.48	3.80	74.8	19.7	433	78.0	483	119	0.0857	15.3	47.2	17.6
254x146x43	6544	677	10.9	3.52	3.84	65.7	17.1	504	92.0	566	141	0.103	23.9	54.8	20.2
305x102x25	4455	123	11.9	1.97	2.31	75.7	32.7	292	24.2	342	38.8	0.0273	4.77	31.6	18.8
305x102x28	5366	155	12.2	2.08	2.40	68.7	28.6	348	30.5	403	48.5	0.0349	7.40	35.9	19.8
305x102x33	6501	194	12.5	2.15	2.47	60.2	24.4	416	37.9	481	60.0	0.0442	12.2	41.8	22.1
305x127x37	7171	336	12.3	2.67	3.03	70.1	23.2	471	54.5	539	85.4	0.0725	14.8	47.2	23.4
305x127x42	8196	389	12.4	2.70	3.06	63.3	20.7	534	62.6	614	98.4	0.0846	21.1	53.4	26.4
305x127x48	9575	461	12.5	2.74	3.10	56.6	18.2	616	73.6	711	116	0.102	31.8	61.2	29.9
305x165x40	8503	764	12.9	3.86	4.24	106	24.9	560	92.6	623	142	0.164	14.7	51.3	20.1
305x165x46	9899	896	13.0	3.90	4.28	93.6	21.9	646	108	720	166	0.195	22.2	58.7	22.5
305x165x54	11700	1063	13.0	3.93	4.32	82.0	19.0	754	127	846	196	0.234	34.8	68.8	26.6
356x127x33	8249	280	14.0	2.58	2.96	96.1	32.4	473	44.7	543	70.3	0.0812	8.79	42.1	23.1
356x127x39	10170	358	14.3	2.68	3.05	83.4	27.3	576	56.8	659	89.1	0.105	15.1	49.8	25.7
356x171x45	12070	811	14.5	3.76	4.23	122	28.9	687	94.8	775	147	0.237	15.8	57.3	26.8
356x171x51	14140	968	14.8	3.86	4.31	110	25.4	796	113	896	174	0.286	23.8	64.9	28.7
356x171x57	16040	1108	14.9	3.91	4.35	99.4	22.8	896	129	1010	199	0.330	33.4	72.6	31.5
356x171x67	19460	1362	15.1	3.99	4.42	86.0	19.4	1071	157	1211	243	0.412	55.7	85.5	35.7
406x140x39	12510	410	15.9	2.87	3.32	120	36.3	629	57.8	724	90.8	0.155	10.7	49.7	27.6
406x140x46	15690	538	16.4	3.03	3.45	104	30.2	778	75.7	888	118	0.207	19.0	58.6	29.8
406x178x54	18720	1021	16.5	3.85	4.35	130	29.9	930	115	1055	178	0.392	23.1	69.0	33.3
406x178x60	21600	1203	16.8	3.97	4.44	118	26.6	1063	135	1199	209	0.466	33.3	76.5	34.6
406x178x67	24330	1365	16.9	3.99	4.48	107	24.0	1189	153	1346	237	0.533	46.1	85.5	38.6
406x178x74	27310	1545	17.0	4.04	4.52	98.4	21.8	1323	172	1501	267	0.608	62.8	94.5	41.9

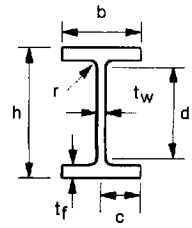
y - y is the major axis and z - z is the minor axis.

(1) The lateral-torsional buckling constants a_{LT} and i_{LT} are for use with Annex F of EC3: Part 1.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 3.



UNIVERSAL BEAMS



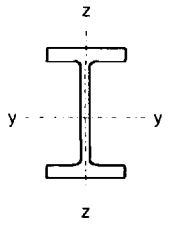
DIMENSIONS AND EC 3 CLASSIFICATION

Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		EC 3 Classification					
										S 275			S 355		
				Web	Flange			Flange	Web	Comp only	Bending only		Comp only	Bending only	
		h	b	t_w	t_f	r	d	c / t_f	d / t_w		y - y	z - z		y - y	z - z
	kg/m	mm	mm	mm	mm	mm	mm								
457x152x52	52.3	449.8	152.4	7.6	10.9	10.2	407.6	6.99	53.6	4	1	1	4	1	1
457x152x60	59.8	454.6	152.9	8.1	13.3	10.2	407.6	5.75	50.3	4	1	1	4	1	1
457x152x67	67.2	458.0	153.8	9.0	15.0	10.2	407.6	5.13	45.3	4	1	1	4	1	1
457x152x74	74.2	462.0	154.4	9.6	17.0	10.2	407.6	4.54	42.5	4	1	1	4	1	1
457x152x82	82.1	465.8	155.3	10.5	18.9	10.2	407.6	4.11	38.8	3	1	1	4	1	1
457x191x67	67.1	453.4	189.9	8.5	12.7	10.2	407.6	7.48	48.0	4	1	1	4	1	1
457x191x74	74.3	457.0	190.4	9.0	14.5	10.2	407.6	6.57	45.3	4	1	1	4	1	1
457x191x82	82.0	460.0	191.3	9.9	16.0	10.2	407.6	5.98	41.2	4	1	1	4	1	1
457x191x89	89.3	463.4	191.9	10.5	17.7	10.2	407.6	5.42	38.8	3	1	1	4	1	1
457x191x98	98.3	467.2	192.8	11.4	19.6	10.2	407.6	4.92	35.8	3	1	1	4	1	1
533x210x82	82.2	528.3	208.8	9.6	13.2	12.7	476.5	7.91	49.6	4	1	1	4	1	1
533x210x92	92.1	533.1	209.3	10.1	15.6	12.7	476.5	6.71	47.2	4	1	1	4	1	1
533x210x101	101.0	536.7	210.0	10.8	17.4	12.7	476.5	6.03	44.1	4	1	1	4	1	1
533x210x109	109.0	539.5	210.8	11.6	18.8	12.7	476.5	5.61	41.1	4	1	1	4	1	1
533x210x122	122.0	544.5	211.9	12.7	21.3	12.7	476.5	4.97	37.5	3	1	1	4	1	1
610x229x101	101.2	602.6	227.6	10.5	14.8	12.7	547.6	7.69	52.2	4	1	1	4	1	1
610x229x113	113.0	607.6	228.2	11.1	17.3	12.7	547.6	6.60	49.3	4	1	1	4	1	1
610x229x125	125.1	612.2	229.0	11.9	19.6	12.7	547.6	5.84	46.0	4	1	1	4	1	1
610x229x140	139.9	617.2	230.2	13.1	22.1	12.7	547.6	5.21	41.8	4	1	1	4	1	1
610x305x149	149.2	612.4	304.8	11.8	19.7	16.5	540.0	7.74	45.8	4	1	1	4	1	1
610x305x179	179.0	620.2	307.1	14.1	23.6	16.5	540.0	6.51	38.3	3	1	1	4	1	1
610x305x238	238.1	635.8	311.4	18.4	31.4	16.5	540.0	4.96	29.3	1	1	1	2	1	1
686x254x125	125.2	677.9	253.0	11.7	16.2	15.2	615.1	7.81	52.6	4	1	1	4	1	1
686x254x140	140.1	683.5	253.7	12.4	19.0	15.2	615.1	6.68	49.6	4	1	1	4	1	1
686x254x152	152.4	687.5	254.5	13.2	21.0	15.2	615.1	6.06	46.6	4	1	1	4	1	1
686x254x170	170.2	692.9	255.8	14.5	23.7	15.2	615.1	5.40	42.4	4	1	1	4	1	1
762x267x134	133.9	750.0	264.4	12.0	15.5	16.5	686.0	8.53	57.2	4	1	1	4	2	2
762x267x147	146.9	754.0	265.2	12.8	17.5	16.5	686.0	7.58	53.6	4	1	1	4	1	1
762x267x173	173.0	762.2	266.7	14.3	21.6	16.5	686.0	6.17	48.0	4	1	1	4	1	1
762x267x197	196.8	769.8	268.0	15.6	25.4	16.5	686.0	5.28	44.0	4	1	1	4	1	1
838x292x176	175.9	834.9	291.7	14.0	18.8	17.8	761.7	7.76	54.4	4	1	1	4	1	1
838x292x194	193.8	840.7	292.4	14.7	21.7	17.8	761.7	6.74	51.8	4	1	1	4	1	1
838x292x226	226.5	850.9	293.8	16.1	26.8	17.8	761.7	5.48	47.3	4	1	1	4	1	1
914x305x201	200.9	903.0	303.3	15.1	20.2	19.1	824.4	7.51	54.6	4	1	1	4	1	1
914x305x224	224.2	910.4	304.1	15.9	23.9	19.1	824.4	6.36	51.8	4	1	1	4	1	1
914x305x253	253.4	918.4	305.5	17.3	27.9	19.1	824.4	5.47	47.7	4	1	1	4	1	1
914x305x289	289.1	926.6	307.7	19.5	32.0	19.1	824.4	4.81	42.3	4	1	1	4	1	1
914x419x343	343.3	911.8	418.5	19.4	32.0	24.1	799.6	6.54	41.2	4	1	1	4	1	1
914x419x388	388.0	921.0	420.5	21.4	36.6	24.1	799.6	5.74	37.4	3	1	1	4	1	1

y - y is the major axis and z - z is the minor axis.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 2.

UNIVERSAL BEAMS



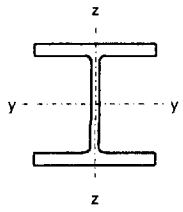
PROPERTIES

Section Designation	Second Moment of Area		Radius of Gyration		Lateral-torsional Buckling Constants (1)			Elastic Modulus		Plastic Modulus		Warping Constant	Torsion Constant	Area of Section	Shear Area
	Axis y - y	Axis z - z	Axis y - y	Axis z - z			Ratio	Axis y - y	Axis z - z	Axis y - y	Axis z - z				
	I_y cm^4	I_z cm^4	i_y cm	i_z cm	i_{LT} cm	a_{LT} cm	a_{LT} / i_{LT}	$W_{el.y}$ cm^3	$W_{el.z}$ cm^3	$W_{pl.y}$ cm^3	$W_{pl.z}$ cm^3	I_w dm^6	I_t cm^4	A cm^2	A_v cm^2
457x152x52	21370	645	17.9	3.11	3.59	121	33.5	950	84.6	1096	133	0.311	21.4	66.6	36.5
457x152x60	25500	795	18.3	3.23	3.69	107	29.0	1122	104	1287	163	0.387	33.8	76.2	39.4
457x152x67	28930	913	18.4	3.27	3.73	96.9	26.0	1263	119	1453	187	0.448	47.7	85.6	43.8
457x152x74	32670	1047	18.6	3.33	3.78	88.6	23.4	1414	136	1627	213	0.518	65.9	94.5	47.1
457x152x82	36590	1185	18.7	3.37	3.82	81.4	21.3	1571	153	1811	240	0.591	89.2	105	51.7
457x191x67	29380	1452	18.5	4.12	4.66	138	29.5	1296	153	1471	237	0.705	37.1	85.5	40.9
457x191x74	33320	1671	18.8	4.20	4.73	126	26.6	1458	176	1653	272	0.818	51.8	94.6	43.7
457x191x82	37050	1871	18.8	4.23	4.76	115	24.2	1611	196	1831	304	0.922	69.2	104	48.1
457x191x89	41020	2089	19.0	4.29	4.81	107	22.2	1770	218	2014	338	1.04	90.7	114	51.3
457x191x98	45730	2347	19.1	4.33	4.85	98.4	20.3	1957	243	2232	379	1.18	121	125	55.9
533x210x82	47540	2007	21.3	4.38	5.01	161	32.1	1800	192	2059	300	1.33	51.5	105	54.2
533x210x92	55230	2389	21.7	4.51	5.12	145	28.4	2072	228	2360	356	1.60	75.7	117	57.6
533x210x101	61520	2692	21.9	4.57	5.17	134	25.9	2292	256	2612	399	1.81	101	129	61.9
533x210x109	66820	2943	21.9	4.60	5.20	126	24.1	2477	279	2828	436	1.99	126	139	66.6
533x210x122	76040	3388	22.1	4.67	5.27	114	21.6	2793	320	3196	500	2.32	178	155	73.2
610x229x101	75780	2915	24.2	4.75	5.45	181	33.2	2515	256	2881	400	2.52	77.0	129	66.9
610x229x113	87320	3434	24.6	4.88	5.56	164	29.5	2874	301	3281	469	2.99	111	144	71.3
610x229x125	98610	3932	24.9	4.97	5.63	150	26.6	3221	343	3676	535	3.45	154	159	76.9
610x229x140	111800	4505	25.0	5.03	5.69	136	23.9	3622	391	4142	611	3.99	216	178	85.0
610x305x149	125900	9308	25.7	7.00	7.75	202	26.1	4111	611	4594	937	8.17	200	190	78.8
610x305x179	153000	11410	25.9	7.07	7.83	173	22.1	4935	743	5547	1144	10.2	340	228	94.2
610x305x238	209500	15840	26.3	7.23	8.00	136	17.0	6589	1017	7486	1574	14.5	785	303	124
686x254x125	118000	4383	27.2	5.24	6.03	203	33.7	3481	346	3994	542	4.80	116	159	84.3
686x254x140	136300	5183	27.6	5.39	6.15	184	30.0	3987	409	4558	638	5.72	169	178	90.2
686x254x152	150400	5784	27.8	5.46	6.21	171	27.5	4374	455	5000	710	6.42	220	194	96.3
686x254x170	170300	6630	28.0	5.53	6.28	155	24.8	4916	518	5631	811	7.42	308	217	106
762x267x134	150700	4788	29.7	5.30	6.15	233	37.9	4018	362	4644	570	6.46	119	171	95.6
762x267x147	168500	5455	30.0	5.40	6.24	216	34.6	4470	411	5156	647	7.40	159	187	102
762x267x173	205300	6850	30.5	5.58	6.40	187	29.3	5387	514	6198	807	9.39	267	220	115
762x267x197	240000	8175	30.9	5.71	6.52	167	25.7	6234	610	7167	959	11.3	404	251	127
838x292x176	246000	7799	33.1	5.90	6.84	242	35.4	5893	535	6808	842	13.0	221	224	124
838x292x194	279200	9066	33.6	6.06	6.97	223	32.0	6641	620	7640	974	15.2	306	247	131
838x292x226	339700	11360	34.3	6.27	7.15	194	27.1	7985	773	9155	1212	19.3	514	289	145
914x305x201	325300	9423	35.7	6.07	7.06	251	35.6	7204	621	8351	982	18.4	291	256	144
914x305x224	376400	11240	36.3	6.27	7.23	229	31.6	8269	739	9535	1163	22.1	422	286	153
914x305x253	436300	13300	36.8	6.42	7.36	205	27.9	9501	871	10940	1371	26.4	626	323	168
914x305x289	504200	15600	37.0	6.51	7.45	184	24.6	10880	1014	12570	1601	31.2	926	368	190
914x419x343	625800	39160	37.8	9.46	10.5	252	23.9	13730	1871	15480	2890	75.8	1193	437	191
914x419x388	719600	45440	38.2	9.59	10.7	226	21.2	15630	2161	17670	3341	88.9	1734	494	212

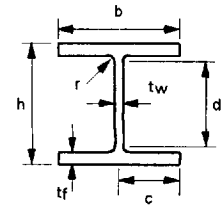
y - y is the major axis and z - z is the minor axis.

(1) The lateral-torsional buckling constants a_{LT} and i_{LT} are for use with Annex F of EC3: Part 1.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 3.



UNIVERSAL COLUMNS



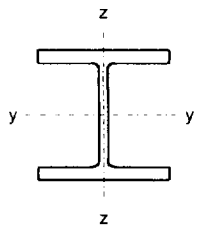
DIMENSIONS AND EC 3 CLASSIFICATION

Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		EC 3 Classification					
										S 275			S 355		
				Web	Flange			Flange	Web	Comp only	Bending only		Comp only	Bending only	
		h	b	t_w	t_f	r	d	c / t_f	d / t_w		y - y	z - z		y - y	z - z
	kg/m	mm	mm	mm	mm	mm	mm								
152x152x23	23.0	152.4	152.2	5.8	6.8	7.6	123.6	11.2	21.3	3	3	3	3	3	3
152x152x30	30.0	157.6	152.9	6.5	9.4	7.6	123.6	8.13	19.0	1	1	1	1	1	1
152x152x37	37.0	161.8	154.4	8.0	11.5	7.6	123.6	6.71	15.4	1	1	1	1	1	1
203x203x46	46.1	203.2	203.6	7.2	11.0	10.2	160.8	9.25	22.3	2	2	2	3	3	3
203x203x52	52.0	206.2	204.3	7.9	12.5	10.2	160.8	8.17	20.4	1	1	1	2	2	2
203x203x60	60.0	209.6	205.8	9.4	14.2	10.2	160.8	7.25	17.1	1	1	1	1	1	1
203x203x71	71.0	215.8	206.4	10.0	17.3	10.2	160.8	5.97	16.1	1	1	1	1	1	1
203x203x86	86.1	222.2	209.1	12.7	20.5	10.2	160.8	5.10	12.7	1	1	1	1	1	1
254x254x73	73.1	254.1	254.6	8.6	14.2	12.7	200.3	8.96	23.3	1	1	1	3	3	3
254x254x89	88.9	260.3	256.3	10.3	17.3	12.7	200.3	7.41	19.4	1	1	1	1	1	1
254x254x107	107.1	266.7	258.8	12.8	20.5	12.7	200.3	6.31	15.6	1	1	1	1	1	1
254x254x132	132.0	276.3	261.3	15.3	25.3	12.7	200.3	5.16	13.1	1	1	1	1	1	1
254x254x167	167.1	289.1	265.2	19.2	31.7	12.7	200.3	4.18	10.4	1	1	1	1	1	1
305x305x97	96.9	307.9	305.3	9.9	15.4	15.2	246.7	9.91	24.9	2	2	2	3	3	3
305x305x118	117.9	314.5	307.4	12.0	18.7	15.2	246.7	8.22	20.6	1	1	1	2	2	2
305x305x137	136.9	320.5	309.2	13.8	21.7	15.2	246.7	7.12	17.9	1	1	1	1	1	1
305x305x158	158.1	327.1	311.2	15.8	25.0	15.2	246.7	6.22	15.6	1	1	1	1	1	1
305x305x198	198.1	339.9	314.5	19.1	31.4	15.2	246.7	5.01	12.9	1	1	1	1	1	1
305x305x240	240.0	352.5	318.4	23.0	37.7	15.2	246.7	4.22	10.7	1	1	1	1	1	1
305x305x283	282.9	365.3	322.2	26.8	44.1	15.2	246.7	3.65	9.21	1	1	1	1	1	1
356x368x129	129.0	355.6	368.6	10.4	17.5	15.2	290.2	10.5	27.9	3	3	3	3	3	3
356x368x153	152.9	362.0	370.5	12.3	20.7	15.2	290.2	8.95	23.6	1	1	1	2	2	2
356x368x177	177.0	368.2	372.6	14.4	23.8	15.2	290.2	7.83	20.2	1	1	1	1	1	1
356x368x202	201.9	374.6	374.7	16.5	27.0	15.2	290.2	6.94	17.6	1	1	1	1	1	1
356x406x235	235.1	381.0	394.8	18.4	30.2	15.2	290.2	6.54	15.8	1	1	1	1	1	1
356x406x287	287.1	393.6	399.0	22.6	36.5	15.2	290.2	5.47	12.8	1	1	1	1	1	1
356x406x340	339.9	406.4	403.0	26.6	42.9	15.2	290.2	4.70	10.9	1	1	1	1	1	1
356x406x393	393.0	419.0	407.0	30.6	49.2	15.2	290.2	4.14	9.48	1	1	1	1	1	1
356x406x467	467.0	436.6	412.2	35.8	58.0	15.2	290.2	3.55	8.11	1	1	1	1	1	1
356x406x551	551.0	455.6	418.5	42.1	67.5	15.2	290.2	3.10	6.89	1	1	1	1	1	1
356x406x634	633.9	474.6	424.0	47.6	77.0	15.2	290.2	2.75	6.10	1	1	1	1	1	1

y - y is the major axis and z - z is the minor axis.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 2.

UNIVERSAL COLUMNS



PROPERTIES

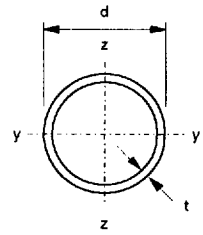
Section Designation	Second Moment of Area		Radius of Gyration		Lateral-torsional Buckling Constants (1)			Elastic Modulus		Plastic Modulus		Warping Constant	Torsion Constant	Area of Section	Shear Area
	Axis y - y I_y cm^4	Axis z - z I_z cm^4	Axis y - y i_y cm	Axis z - z i_z cm	i_{LT} cm	a_{LT} cm	Ratio a_{LT} / i_{LT}	Axis y - y $W_{el.y}$ cm^3	Axis z - z $W_{el.z}$ cm^3	Axis y - y $W_{pl.y}$ cm^3	Axis z - z $W_{pl.z}$ cm^3	I_w dm^6	I_t cm^4	A cm^2	A_v cm^2
152x152x23	1250	400	6.54	3.70	4.00	67.6	16.9	164	52.6	182	80.2	0.0212	4.63	29.2	9.97
152x152x30	1748	560	6.76	3.83	4.09	54.1	13.2	222	73.3	248	112	0.0308	10.5	38.3	11.6
152x152x37	2210	706	6.85	3.87	4.15	45.6	11.0	273	91.5	309	140	0.0399	19.2	47.1	14.3
203x203x46	4568	1548	8.82	5.13	5.47	80.3	14.7	450	152	497	231	0.143	22.2	58.7	17.0
203x203x52	5259	1778	8.91	5.18	5.51	72.5	13.2	510	174	567	264	0.167	31.8	66.3	18.7
203x203x60	6125	2065	8.95	5.20	5.54	64.6	11.6	584	201	656	305	0.197	47.2	76.4	22.2
203x203x71	7618	2537	9.18	5.30	5.61	55.8	9.94	706	246	799	374	0.250	80.2	90.4	24.3
203x203x86	9449	3127	9.28	5.34	5.68	48.2	8.49	850	299	977	456	0.318	137	110	30.7
254x254x73	11410	3908	11.1	6.48	6.87	98.8	14.4	898	307	992	465	0.562	57.6	93.1	25.6
254x254x89	14270	4857	11.2	6.55	6.94	83.7	12.1	1096	379	1224	575	0.717	102	113	30.8
254x254x107	17510	5928	11.3	6.59	7.01	72.2	10.3	1313	458	1484	697	0.898	172	136	38.1
254x254x132	22530	7531	11.6	6.69	7.11	61.0	8.58	1631	576	1869	878	1.19	319	168	46.2
254x254x167	30000	9870	11.9	6.81	7.24	51.1	7.06	2075	744	2424	1137	1.63	626	213	58.9
305x305x97	22250	7308	13.4	7.69	8.19	131	16.0	1445	479	1592	726	1.56	91.2	123	35.6
305x305x118	27670	9059	13.6	7.77	8.27	111	13.4	1760	589	1958	895	1.98	161	150	43.2
305x305x137	32810	10700	13.7	7.83	8.34	97.9	11.7	2048	692	2297	1053	2.39	249	174	49.8
305x305x158	38750	12570	13.9	7.90	8.42	87.1	10.3	2369	808	2680	1230	2.87	378	201	57.3
305x305x198	50900	16300	14.2	8.04	8.55	72.7	8.50	2995	1037	3440	1581	3.88	734	252	70.5
305x305x240	64200	20310	14.5	8.15	8.68	62.9	7.25	3643	1276	4247	1951	5.03	1271	306	85.8
305x305x283	78870	24630	14.8	8.27	8.80	55.9	6.35	4318	1529	5105	2342	6.35	2034	360	101
356x368x129	40250	14610	15.6	9.43	9.98	165	16.6	2264	793	2479	1199	4.18	153	164	42.5
356x368x153	48590	17550	15.8	9.49	10.1	143	14.2	2684	948	2965	1435	5.11	251	195	50.3
356x368x177	57120	20530	15.9	9.54	10.1	126	12.5	3103	1102	3455	1671	6.09	381	226	58.8
356x368x202	66260	23690	16.1	9.60	10.2	113	11.1	3538	1264	3972	1920	7.16	558	257	67.5
356x406x235	79080	30990	16.3	10.2	10.8	108	10.1	4151	1570	4687	2383	9.54	812	299	75.7
356x406x287	99880	38680	16.5	10.3	10.9	92.5	8.49	5075	1939	5812	2949	12.3	1441	366	93.8
356x406x340	122500	46850	16.8	10.4	11.0	81.3	7.37	6031	2325	6999	3544	15.5	2343	433	112
356x406x393	146600	55370	17.1	10.5	11.2	73.1	6.55	6998	2721	8222	4154	18.9	3545	501	130
356x406x467	183000	67830	17.5	10.7	11.3	64.7	5.71	8383	3291	10000	5034	24.3	5809	595	155
356x406x551	226900	82670	18.0	10.9	11.5	58.0	5.04	9962	3951	12080	6058	31.1	9240	702	186
356x406x634	274800	98130	18.4	11.0	11.7	53.2	4.54	11580	4629	14240	7108	38.8	13720	808	215

y - y is the major axis and z - z is the minor axis.

(1) The lateral-torsional buckling constants a_{LT} and i_{LT} are for use with Annex F of EC 3: Part 1.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 3.

CIRCULAR HOLLOW SECTIONS



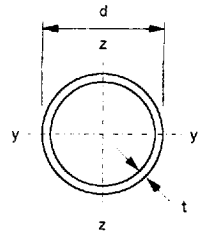
DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Outside Diameter	Thickness									Comp only	Bending only	Comp only	Bending only
d	t		A	I	i	W_{el}	W_{pl}	I_t	C_t				
mm	mm	kg/m	cm^2	cm^4	cm	cm^3	cm^3	cm^4	cm^3				
21.3	3.2 Δ	1.43	1.82	0.768	0.650	0.722	1.06	1.54	1.44	1	1	1	1
26.9	3.2 Δ	1.87	2.38	1.70	0.846	1.27	1.81	3.41	2.53	1	1	1	1
33.7	2.6 Δ	1.99	2.54	3.09	1.10	1.84	2.52	6.19	3.67	1	1	1	1
	3.2 Δ	2.41	3.07	3.60	1.08	2.14	2.99	7.21	4.28	1	1	1	1
	4.0 Δ	2.93	3.73	4.19	1.06	2.49	3.55	8.38	4.97	1	1	1	1
42.4	2.6 Δ	2.55	3.25	6.46	1.41	3.05	4.12	12.9	6.10	1	1	1	1
	3.2 Δ	3.09	3.94	7.62	1.39	3.59	4.93	15.2	7.19	1	1	1	1
	4.0 Δ	3.79	4.83	8.99	1.36	4.24	5.92	18.0	8.48	1	1	1	1
48.3	3.2	3.56	4.53	11.6	1.60	4.80	6.52	23.2	9.59	1	1	1	1
	4.0	4.37	5.57	13.8	1.57	5.70	7.87	27.5	11.4	1	1	1	1
	5.0	5.34	6.80	16.2	1.54	6.69	9.42	32.3	13.4	1	1	1	1
60.3	3.2	4.51	5.74	23.5	2.02	7.78	10.4	46.9	15.6	1	1	1	1
	4.0	5.55	7.07	28.2	2.00	9.34	12.7	56.3	18.7	1	1	1	1
	5.0	6.82	8.69	33.5	1.96	11.1	15.3	67.0	22.2	1	1	1	1
76.1	3.2	5.75	7.33	48.8	2.58	12.8	17.0	97.6	25.6	1	1	1	1
	4.0	7.11	9.06	59.1	2.55	15.5	20.8	118	31.0	1	1	1	1
	5.0	8.77	11.2	70.9	2.52	18.6	25.3	142	37.3	1	1	1	1
88.9	3.2	6.76	8.62	79.2	3.03	17.8	23.5	158	35.6	1	1	1	1
	4.0	8.38	10.7	96.3	3.00	21.7	28.9	193	43.3	1	1	1	1
	5.0	10.3	13.2	116	2.97	26.2	35.2	233	52.4	1	1	1	1
114.3	3.6	9.83	12.5	192	3.92	33.6	44.1	384	67.2	1	1	1	1
	5.0	13.5	17.2	257	3.87	45.0	59.8	514	89.9	1	1	1	1
	6.3	16.8	21.4	313	3.82	54.7	73.6	625	109	1	1	1	1
139.7	5.0	16.6	21.2	481	4.77	68.8	90.8	961	138	1	1	1	1
	6.3	20.7	26.4	589	4.72	84.3	112	1177	169	1	1	1	1
	8.0	26.0	33.1	720	4.66	103	139	1441	206	1	1	1	1
	10.0	32.0	40.7	862	4.60	123	169	1724	247	1	1	1	1

Δ Sections marked thus are normally available in grade S 275 only.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

CIRCULAR HOLLOW SECTIONS



DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

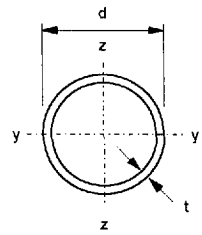
Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Outside Diameter d	Thickness t									Comp only	Bending only	Comp only	Bending only
mm	mm	kg/m	cm^2	cm^4	cm	cm^3	cm^3	cm^4	cm^3				
168.3	5.0	20.1	25.7	856	5.78	102	133	1712	203	1	1	2	2
	6.3	25.2	32.1	1053	5.73	125	165	2107	250	1	1	1	1
	8.0	31.6	40.3	1297	5.67	154	206	2595	308	1	1	1	1
	10.0	39.0	49.7	1564	5.61	186	251	3128	372	1	1	1	1
193.7	5.0	23.3	29.6	1320	6.67	136	178	2640	273	1	1	2	2
	6.3	29.1	37.1	1630	6.63	168	221	3260	337	1	1	1	1
	8.0	36.6	46.7	2016	6.57	208	276	4031	416	1	1	1	1
	10.0	45.3	57.7	2442	6.50	252	338	4883	504	1	1	1	1
	12.5	55.9	71.2	2934	6.42	303	411	5869	606	1	1	1	1
	16.0 ♦	70.1	89.3	3554	6.31	367	507	7109	734	1	1	1	1
219.1	5.0	26.4	33.6	1928	7.57	176	229	3856	352	2	2	2	2
	6.3	33.1	42.1	2386	7.53	218	285	4772	436	1	1	2	2
	8.0	41.6	53.1	2960	7.47	270	357	5919	540	1	1	1	1
	10.0	51.6	65.7	3598	7.40	328	438	7197	657	1	1	1	1
	12.5	63.7	81.1	4345	7.32	397	534	8689	793	1	1	1	1
	16.0	80.1	102	5297	7.20	483	661	10590	967	1	1	1	1
	20.0 ♦	98.2	125	6261	7.07	572	795	12520	1143	1	1	1	1
244.5	6.3	37.0	47.1	3346	8.42	274	358	6692	547	1	1	2	2
	8.0	46.7	59.4	4160	8.37	340	448	8321	681	1	1	1	1
	10.0	57.8	73.7	5073	8.30	415	550	10150	830	1	1	1	1
	12.5	71.5	91.1	6147	8.21	503	673	12290	1006	1	1	1	1
	16.0	90.2	115	7533	8.10	616	837	15070	1232	1	1	1	1
	20.0 ♦	111	141	8957	7.97	733	1011	17910	1465	1	1	1	1
	25.0 † ♦	135	172	10520	7.81	860	1210	21030	1721	1	1	1	1
273.0	6.3	41.4	52.8	4696	9.43	344	448	9392	688	2	2	2	2
	8.0	52.3	66.6	5852	9.37	429	562	11700	857	1	1	2	2
	10.0	64.9	82.6	7154	9.31	524	692	14310	1048	1	1	1	1
	12.5	80.3	102	8697	9.22	637	849	17390	1274	1	1	1	1
	16.0	101	129	10710	9.10	784	1058	21410	1569	1	1	1	1
	20.0 ♦	125	159	12800	8.97	938	1283	25600	1875	1	1	1	1
	25.0 ♦	153	195	15130	8.81	1108	1543	30250	2216	1	1	1	1

† Sections marked thus are not included in BS4848: Part 2.

♦ Check availability of section.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

CIRCULAR HOLLOW SECTIONS



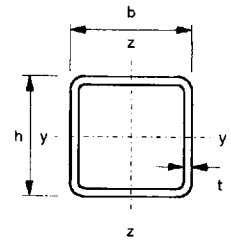
DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Outside Diameter d mm	Thickness t mm	kg/m	A cm^2	I cm^4	i cm	W_{el} cm^3	W_{pl} cm^3	I_t cm^4	C_t cm^3	Comp only	Bending only	Comp only	Bending only
323.9	6.3	49.3	62.9	7929	11.2	490	636	15860	979	2	2	3	3
	8.0	62.3	79.4	9910	11.2	612	799	19820	1224	1	1	2	2
	10.0	77.4	98.6	12160	11.1	751	986	24320	1501	1	1	1	1
	12.5	96.0	122	14850	11.0	917	1213	29690	1833	1	1	1	1
	16.0	121	155	18390	10.9	1136	1518	36780	2271	1	1	1	1
	20.0 ♦	150	191	22140	10.8	1367	1850	44280	2734	1	1	1	1
	25.0 ♦	184	235	26400	10.6	1630	2239	52800	3260	1	1	1	1
355.6	8.0	68.6	87.4	13200	12.3	742	967	26400	1485	2	2	2	2
	10.0	85.2	109	16220	12.2	912	1195	32450	1825	1	1	2	2
	12.5	106	135	19850	12.1	1117	1472	39700	2233	1	1	1	1
	16.0	134	171	24660	12.0	1387	1847	49330	2774	1	1	1	1
	20.0 ♦	166	211	29790	11.9	1676	2255	59580	3351	1	1	1	1
	25.0 ♦	204	260	35680	11.7	2007	2738	71350	4013	1	1	1	1
406.4	10.0	97.8	125	24480	14.0	1205	1572	48950	2409	1	1	2	2
	12.5	121	155	30030	13.9	1478	1940	60060	2956	1	1	1	1
	16.0	154	196	37450	13.8	1843	2440	74900	3686	1	1	1	1
	20.0 ♦	191	243	45430	13.7	2236	2989	90860	4472	1	1	1	1
	25.0 ♦	235	300	54700	13.5	2692	3642	109400	5384	1	1	1	1
	32.0 ♦	295	376	66430	13.3	3269	4497	132900	6539	1	1	1	1
457.0	10.0	110	140	35090	15.8	1536	1998	70180	3071	2	2	2	2
	12.5	137	175	43140	15.7	1888	2470	86290	3776	1	1	2	2
	16.0	174	222	53960	15.6	2361	3113	107900	4723	1	1	1	1
	20.0 ♦	216	275	65680	15.5	2874	3822	131400	5749	1	1	1	1
	25.0 ♦	266	339	79420	15.3	3475	4671	158800	6951	1	1	1	1
	32.0 ♦	335	427	97010	15.1	4246	5791	194000	8491	1	1	1	1
	40.0 ♦	411	524	114900	14.8	5031	6977	229900	10060	1	1	1	1
508.0	10.0	123	156	48520	17.6	1910	2480	97040	3820	2	2	3	3
	12.5	153	195	59760	17.5	2353	3070	119500	4705	1	1	2	2
	16.0	194	247	74910	17.4	2949	3874	149800	5898	1	1	1	1
	20.0 ♦	241	307	91430	17.3	3600	4766	182900	7199	1	1	1	1
	25.0 ♦	298	379	110900	17.1	4367	5837	221800	8734	1	1	1	1
	32.0 ♦	376	479	136100	16.9	5360	7261	272300	10720	1	1	1	1
	40.0 ♦	462	588	162200	16.6	6385	8782	324400	12770	1	1	1	1
	50.0 ♦	565	719	190900	16.3	7515	10530	381800	15030	1	1	1	1

♦ Check availability of section.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

SQUARE HOLLOW SECTIONS

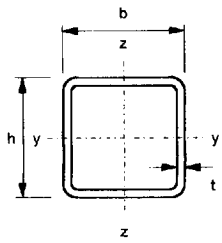


DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Size	Thickness									Comp only	Bending only	Comp only	Bending only
h x b	t		A	I	i	W_{el}	W_{pl}	I_t	C_t				
mm.mm	mm	kg/m	cm^2	cm^4	cm	cm^3	cm^3	cm^4	cm^3				
20x20	2.0	1.12	1.42	0.759	0.731	0.759	0.951	1.22	1.07	1	1	1	1
	2.5	1.35	1.72	0.865	0.709	0.865	1.12	1.41	1.21	1	1	1	1
25x25	2.0	1.43	1.82	1.59	0.935	1.27	1.56	2.52	1.81	1	1	1	1
	2.5	1.74	2.22	1.85	0.914	1.48	1.86	2.97	2.09	1	1	1	1
	3.0	2.04	2.60	2.06	0.892	1.65	2.12	3.36	2.31	1	1	1	1
	3.2	2.15	2.74	2.14	0.883	1.71	2.21	3.49	2.38	1	1	1	1
30x30	2.5	2.14	2.72	3.40	1.12	2.27	2.79	5.40	3.22	1	1	1	1
	3.0	2.51	3.20	3.84	1.10	2.56	3.21	6.17	3.61	1	1	1	1
	3.2	2.65	3.38	4.00	1.09	2.67	3.37	6.45	3.75	1	1	1	1
40x40	2.5	2.92	3.72	8.67	1.53	4.33	5.21	13.6	6.23	1	1	1	1
	3.0	3.45	4.40	9.96	1.51	4.98	6.07	15.7	7.11	1	1	1	1
	3.2	3.66	4.66	10.4	1.50	5.22	6.40	16.5	7.43	1	1	1	1
	4.0	4.46	5.68	12.1	1.46	6.07	7.61	19.5	8.56	1	1	1	1
	5.0	5.40	6.88	13.8	1.42	6.92	8.92	22.6	9.65	1	1	1	1
50x50	2.5	3.71	4.72	17.7	1.94	7.07	8.38	27.4	10.2	1	1	1	1
	3.0	4.39	5.60	20.5	1.91	8.20	9.83	32.0	11.8	1	1	1	1
	3.2	4.66	5.94	21.6	1.91	8.62	10.4	33.8	12.4	1	1	1	1
	4.0	5.72	7.28	25.5	1.87	10.2	12.5	40.4	14.5	1	1	1	1
	5.0	6.97	8.88	29.6	1.83	11.9	14.9	47.6	16.7	1	1	1	1
	6.3	8.49	10.8	33.9	1.77	13.6	17.5	55.3	18.9	1	1	1	1
60x60	3.0	5.34	6.80	36.6	2.32	12.2	14.5	56.9	17.7	1	1	1	1
	3.2	5.67	7.22	38.7	2.31	12.9	15.3	60.1	18.6	1	1	1	1
	4.0	6.97	8.88	46.1	2.28	15.4	18.6	72.4	22.1	1	1	1	1
	5.0	8.54	10.9	54.4	2.24	18.1	22.3	86.3	25.8	1	1	1	1
	6.3	10.5	13.3	63.4	2.18	21.1	26.6	102	29.7	1	1	1	1
	8.0	12.8	16.3	72.4	2.11	24.1	31.4	119	33.5	1	1	1	1
70x70	3.0	6.28	8.00	59.6	2.73	17.0	20.0	92.1	24.8	1	1	1	1
	3.6	7.46	9.50	69.5	2.70	19.9	23.6	108	28.7	1	1	1	1
	5.0	10.1	12.9	90.1	2.64	25.7	31.2	142	36.8	1	1	1	1
	6.3	12.5	15.9	106	2.59	30.4	37.6	169	43.0	1	1	1	1
	8.0	15.3	19.5	123	2.51	35.3	45.0	200	49.4	1	1	1	1
80x80	3.0	7.22	9.20	90.6	3.14	22.7	26.5	139	33.1	1	1	1	1
	3.6	8.59	10.9	106	3.11	26.5	31.3	164	38.5	1	1	1	1
	5.0	11.7	14.9	139	3.05	34.7	41.7	217	49.8	1	1	1	1
	6.3	14.4	18.4	165	3.00	41.3	50.5	261	58.8	1	1	1	1
	8.0	17.8	22.7	194	2.92	48.6	60.9	312	68.5	1	1	1	1
90x90	3.6	9.72	12.4	154	3.52	34.1	40.0	237	49.7	1	1	1	1
	5.0	13.3	16.9	202	3.46	45.0	53.6	315	64.9	1	1	1	1
	6.3	16.4	20.9	242	3.41	53.9	65.3	381	77.1	1	1	1	1
	8.0	20.4	25.9	288	3.33	64.0	79.2	459	90.7	1	1	1	1

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

SQUARE HOLLOW SECTIONS



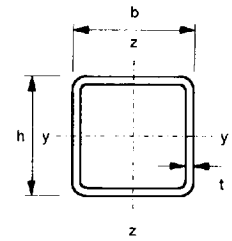
DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Size	Thickness									Comp only	Bending only	Comp only	Bending only
h x b	t		A	I	i	W_{el}	W_{pl}	I_t	C_t				
mm.mm	mm	kg/m	cm^2	cm^4	cm	cm^3	cm^3	cm^4	cm^3				
100x100	4.0	12.0	15.3	234	3.91	46.8	54.9	361	68.2	1	1	1	1
	5.0	14.8	18.9	283	3.87	56.6	67.1	439	81.9	1	1	1	1
	6.3	18.4	23.4	341	3.81	68.2	82.0	533	97.9	1	1	1	1
	8.0	22.9	29.1	408	3.74	81.5	99.9	646	116	1	1	1	1
	10.0	27.9	35.5	474	3.65	94.9	119	761	134	1	1	1	1
120x120	4.0	14.5	18.5	413	4.73	68.9	80.3	634	101	1	1	2	2
	5.0	18.0	22.9	503	4.69	83.8	98.4	775	122	1	1	1	1
	6.3	22.3	28.5	610	4.63	102	121	949	147	1	1	1	1
	8.0	27.9	35.5	738	4.56	123	149	1159	176	1	1	1	1
	10.0	34.2	43.5	870	4.47	145	178	1381	206	1	1	1	1
	12.5	41.6	53.0	1009	4.36	168	212	1624	237	1	1	1	1
140x140	5.0 †	21.1	26.9	814	5.50	116	136	1251	170	1	1	1	1
	6.3 †	26.3	33.5	994	5.45	142	168	1538	206	1	1	1	1
	8.0 †	32.9	41.9	1212	5.38	173	207	1889	249	1	1	1	1
	10.0 †	40.4	51.5	1441	5.29	206	250	2269	294	1	1	1	1
	12.5 †	49.5	63.0	1691	5.18	242	299	2695	342	1	1	1	1
150x150	5.0	22.7	28.9	1009	5.91	135	157	1548	197	1	1	2	2
	6.3	28.3	36.0	1236	5.86	165	194	1907	240	1	1	1	1
	8.0	35.4	45.1	1510	5.78	201	240	2348	291	1	1	1	1
	10.0	43.6	55.5	1803	5.70	240	290	2829	345	1	1	1	1
	12.5	53.4	68.0	2125	5.59	283	348	3372	403	1	1	1	1
	16.0	66.4	84.5	2500	5.44	333	421	4029	468	1	1	1	1
160x160	5.0 †	24.2	30.9	1234	6.32	154	179	1890	226	1	1	2	2
	6.0 †	28.9	36.8	1450	6.28	181	212	2230	264	1	1	1	1
	6.3 †	30.3	38.5	1513	6.27	189	222	2330	276	1	1	1	1
	8.0 †	37.9	48.3	1853	6.19	232	275	2875	335	1	1	1	1
	10.0 †	46.7	59.5	2219	6.11	277	333	3473	399	1	1	1	1
	12.5 †	57.3	73.0	2627	6.00	328	402	4154	468	1	1	1	1
180x180	5.0 †	27.4	34.9	1777	7.14	197	229	2715	290	2	2	3	3
	6.3	34.2	43.6	2186	7.08	243	283	3357	355	1	1	1	1
	8.0	43.0	54.7	2689	7.01	299	352	4156	434	1	1	1	1
	10.0	53.0	67.5	3237	6.92	360	429	5041	519	1	1	1	1
	12.5	65.2	83.0	3856	6.82	428	519	6062	613	1	1	1	1
	16.0	81.4	104	4607	6.66	512	634	7339	725	1	1	1	1
200x200	5.0 †	30.5	38.9	2460	7.95	246	284	3752	362	3	3	4	4
	6.3	38.2	48.6	3033	7.90	303	353	4647	444	1	1	2	2
	8.0	48.0	61.1	3744	7.83	374	439	5770	545	1	1	1	1
	10.0	59.3	75.5	4525	7.74	452	536	7020	655	1	1	1	1
	12.5	73.0	93.0	5419	7.63	542	651	8479	779	1	1	1	1
	16.0	91.5	117	6524	7.48	652	799	10330	929	1	1	1	1
250x250	6.3	48.1	61.2	6049	9.94	484	559	9228	712	3	3	4	4
	8.0	60.5	77.1	7510	9.87	601	699	11510	880	1	1	2	2
	10.0	75.0	95.5	9141	9.78	731	858	14090	1065	1	1	1	1
	12.5	92.6	118	11050	9.68	884	1048	17140	1279	1	1	1	1
	16.0	117	149	13480	9.53	1078	1298	21110	1548	1	1	1	1

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

SQUARE HOLLOW SECTIONS



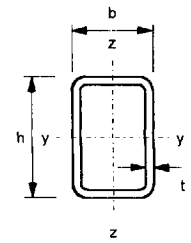
DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per Metre	Area of Section	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		EC 3 Classification			
										S 275		S 355	
Size	Thickness									Comp only	Bending only	Comp only	Bending only
h x b	t		A	I	i	W_{el}	W_{pl}	I_t	C_t				
mm.mm	mm	kg/m	cm^2	cm^4	cm	cm^3	cm^3	cm^4	cm^3				
300x300	6.3 †	57.9	73.8	10600	12.0	706	812	16120	1043	4	4	4	4
	8.0	73.1	93.1	13210	11.9	881	1018	20170	1294	2	2	4	4
	10.0	90.7	116	16150	11.8	1077	1254	24780	1575	1	1	2	2
	12.5	112	143	19630	11.7	1309	1538	30290	1905	1	1	1	1
	16.0	142	181	24160	11.6	1610	1916	37570	2327	1	1	1	1
350x350	8.0	85.7	109	21240	14.0	1214	1398	32350	1789	4	4	4	4
	10.0	106	136	26050	13.9	1489	1725	39840	2186	2	2	3	3
	12.5	132	168	31810	13.8	1817	2122	48870	2655	1	1	1	1
	16.0	167	213	39370	13.6	2250	2655	60900	3265	1	1	1	1
400x400	10.0	122	156	39350	15.9	1968	2272	60030	2896	3	3	4	4
	12.5	152	193	48190	15.8	2409	2800	73820	3530	1	1	2	2
	16.0	192	245	59910	15.7	2995	3514	92310	4363	1	1	1	1
	20.0	237	302	72390	15.5	3620	4292	112300	5240	1	1	1	1

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

RECTANGULAR HOLLOW SECTIONS



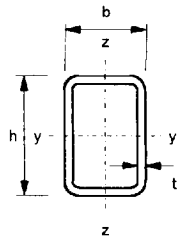
DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per	Area of	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		EC 3 Classification					
														S 275			S 355		
Size	Thick-ness	Metre	Section	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z			Comp only	Bending only		Comp only	Bending only	
h x b	t		A	I_y	I_z	i_y	i_z	$W_{el,y}$	$W_{el,z}$	$W_{pl,y}$	$W_{pl,z}$	I_t	C_t						
mm.mm	mm	kg/m	cm^2	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3		y - y	z - z		y - y	z - z
50x25	2.5	2.72	3.47	10.6	3.44	1.75	0.996	4.25	2.75	5.41	3.26	8.41	4.62	1	1	1	1	1	1
	3.0	3.22	4.10	12.2	3.89	1.73	0.975	4.88	3.11	6.30	3.77	9.64	5.21	1	1	1	1	1	1
	3.2	3.41	4.34	12.8	4.05	1.72	0.966	5.11	3.24	6.64	3.96	10.1	5.42	1	1	1	1	1	1
50x30	2.5	2.92	3.72	12.0	5.30	1.80	1.19	4.81	3.53	6.01	4.16	11.7	5.74	1	1	1	1	1	1
	3.0	3.45	4.40	13.9	6.04	1.78	1.17	5.54	4.03	7.01	4.83	13.5	6.52	1	1	1	1	1	1
	3.2	3.66	4.66	14.5	6.31	1.77	1.16	5.82	4.21	7.39	5.08	14.2	6.81	1	1	1	1	1	1
	4.0	4.46	5.68	17.0	7.25	1.73	1.13	6.80	4.83	8.81	6.01	16.6	7.79	1	1	1	1	1	1
	5.0	5.40	6.88	19.5	8.13	1.68	1.09	7.79	5.42	10.4	6.98	19.0	8.71	1	1	1	1	1	1
60x40	2.5	3.71	4.72	23.1	12.2	2.21	1.61	7.71	6.10	9.43	7.09	25.0	9.74	1	1	1	1	1	1
	3.0	4.39	5.60	26.9	14.1	2.19	1.59	8.96	7.04	11.1	8.29	29.2	11.2	1	1	1	1	1	1
	3.2	4.66	5.94	28.3	14.8	2.18	1.58	9.44	7.39	11.7	8.75	30.8	11.8	1	1	1	1	1	1
	4.0	5.72	7.28	33.6	17.3	2.15	1.54	11.2	8.67	14.1	10.5	36.6	13.7	1	1	1	1	1	1
	5.0	6.97	8.88	39.2	20.0	2.10	1.50	13.1	10.0	16.8	12.4	43.0	15.8	1	1	1	1	1	1
	6.3	8.49	10.8	45.1	22.6	2.04	1.45	15.0	11.3	19.9	14.6	49.7	17.7	1	1	1	1	1	1
80x40	3.0	5.34	6.80	55.0	18.2	2.85	1.64	13.8	9.10	17.3	10.5	43.7	15.3	1	1	1	1	1	1
	3.2	5.67	7.22	58.1	19.1	2.84	1.63	14.5	9.56	18.3	11.1	46.1	16.1	1	1	1	1	1	1
	4.0	6.97	8.88	69.6	22.6	2.80	1.59	17.4	11.3	22.2	13.4	55.1	18.9	1	1	1	1	1	1
	5.0	8.54	10.9	82.4	26.2	2.75	1.55	20.6	13.1	26.7	15.9	65.0	21.9	1	1	1	1	1	1
	6.3	10.5	13.3	96.5	29.8	2.69	1.50	24.1	14.9	31.9	18.8	75.8	24.9	1	1	1	1	1	1
	8.0	12.8	16.3	111	33.1	2.61	1.42	27.7	16.6	37.8	21.8	86.3	27.6	1	1	1	1	1	1
90x50	3.0	6.28	8.00	85.4	33.8	3.27	2.05	19.0	13.5	23.4	15.5	76.4	22.4	1	1	1	2	1	2
	3.6	7.46	9.50	99.8	39.1	3.24	2.03	22.2	15.6	27.6	18.1	89.3	25.9	1	1	1	1	1	1
	5.0	10.1	12.9	130	50.0	3.18	1.97	28.9	20.0	36.6	23.9	116	32.9	1	1	1	1	1	1
	6.3	12.5	15.9	154	58.1	3.12	1.91	34.2	23.3	44.2	28.5	138	38.2	1	1	1	1	1	1
	8.0	15.3	19.5	180	66.3	3.04	1.84	40.0	26.5	53.0	33.7	161	43.4	1	1	1	1	1	1
100x50	3.0	6.75	8.60	111	37.1	3.59	2.08	22.2	14.8	27.6	16.9	88.3	25.0	1	1	1	2	1	2
	3.2	7.18	9.14	117	39.1	3.58	2.07	23.5	15.6	29.2	17.9	93.3	26.4	1	1	1	2	1	2
	4.0	8.86	11.3	142	46.7	3.55	2.03	28.4	18.7	35.7	21.7	113	31.4	1	1	1	1	1	1
	5.0	10.9	13.9	170	55.1	3.50	1.99	34.0	22.0	43.3	26.1	135	37.0	1	1	1	1	1	1
	6.3	13.4	17.1	202	64.2	3.44	1.94	40.5	25.7	52.5	31.3	160	43.0	1	1	1	1	1	1
	8.0	16.6	21.1	238	73.5	3.36	1.86	47.6	29.4	63.1	37.1	187	49.1	1	1	1	1	1	1
100x60	3.0	7.22	9.20	125	56.2	3.69	2.47	25.0	18.7	30.5	21.3	121	30.7	1	1	1	2	1	2
	3.6	8.59	10.9	147	65.4	3.66	2.45	29.3	21.8	36.0	25.1	142	35.6	1	1	1	1	1	1
	5.0	11.7	14.9	192	84.7	3.60	2.39	38.5	28.2	48.1	33.3	187	45.9	1	1	1	1	1	1
	6.3	14.4	18.4	230	99.9	3.54	2.33	46.0	33.3	58.4	40.2	224	53.9	1	1	1	1	1	1
	8.0	17.8	22.7	272	116	3.46	2.26	54.4	38.7	70.5	48.1	266	62.4	1	1	1	1	1	1
120x60	3.6	9.72	12.4	230	76.9	4.31	2.49	38.3	25.6	47.6	29.2	183	43.3	1	1	1	2	1	2
	5.0	13.3	16.9	304	99.9	4.24	2.43	50.7	33.3	63.9	38.8	242	56.0	1	1	1	1	1	1
	6.3	16.4	20.9	366	118	4.18	2.38	61.0	39.4	78.0	46.9	290	66.0	1	1	1	1	1	1
	8.0	20.4	25.9	437	138	4.10	2.31	72.8	45.9	94.8	56.4	344	76.8	1	1	1	1	1	1

y - y is the major axis and z - z is the minor axis.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

RECTANGULAR HOLLOW SECTIONS



DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

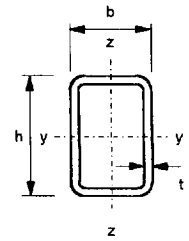
Section Designation		Mass per	Area of	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		EC 3 Classification					
														S 275			S 355		
Size	Thick-ness	Metre	Section	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z			Comp only	Bending only		Comp only	Bending only	
h x b	t		A	I_y	I_z	i_y	i_z	$W_{el.y}$	$W_{el.z}$	$W_{pl.y}$	$W_{pl.z}$	I_t	C_t						
mm.mm	mm	kg/m	cm^2	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3		y - y	z - z		y - y	z - z
120x80	5.0	14.8	18.9	370	195	4.43	3.21	61.7	48.8	75.4	56.7	401	77.9	1	1	1	1	1	1
	6.3	18.4	23.4	447	234	4.37	3.16	74.6	58.4	92.3	69.1	486	93.0	1	1	1	1	1	1
	8.0	22.9	29.1	537	278	4.29	3.09	89.5	69.4	113	83.9	586	110	1	1	1	1	1	1
	10.0	27.9	35.5	628	320	4.20	3.00	105	80.0	134	99.4	688	126	1	1	1	1	1	1
150x100	5.0	18.7	23.9	747	396	5.59	4.07	99.5	79.1	121	90.8	806	127	1	1	1	2	1	2
	6.3	23.3	29.7	910	479	5.53	4.02	121	95.9	148	111	985	153	1	1	1	1	1	1
	8.0	29.1	37.1	1106	577	5.46	3.94	147	115	183	137	1202	184	1	1	1	1	1	1
	10.0	35.7	45.5	1312	678	5.37	3.86	175	136	220	164	1431	215	1	1	1	1	1	1
	12.5	43.6	55.5	1532	781	5.25	3.75	204	156	263	194	1680	246	1	1	1	1	1	1
160x80	5.0	18.0	22.9	753	251	5.74	3.31	94.1	62.8	117	71.7	599	106	1	1	1	2	1	2
	6.3	22.3	28.5	917	302	5.68	3.26	115	75.6	144	87.7	729	127	1	1	1	1	1	1
	8.0	27.9	35.5	1113	361	5.60	3.19	139	90.2	177	107	882	151	1	1	1	1	1	1
	10.0	34.2	43.5	1318	419	5.50	3.10	165	105	213	127	1041	175	1	1	1	1	1	1
	12.5	41.6	53.0	1536	476	5.38	3.00	192	119	254	150	1206	199	1	1	1	1	1	1
200x100	5.0	22.7	28.9	1509	509	7.23	4.20	151	102	186	115	1202	172	3	1	3	4	1	4
	6.3	28.3	36.0	1851	618	7.17	4.14	185	124	231	141	1473	208	1	1	1	2	1	2
	8.0	35.4	45.1	2269	747	7.09	4.07	227	149	286	174	1802	251	1	1	1	1	1	1
	10.0	43.6	55.5	2718	881	7.00	3.98	272	176	346	209	2154	296	1	1	1	1	1	1
	12.5	53.4	68.0	3218	1022	6.88	3.88	322	204	417	249	2541	342	1	1	1	1	1	1
	16.0	66.4	84.5	3808	1175	6.71	3.73	381	235	505	297	2988	393	1	1	1	1	1	1
200x120	5.0 †	24.2	30.9	1699	767	7.42	4.98	170	128	206	144	1646	210	3	1	3	4	1	4
	6.0 †	28.9	36.8	2000	899	7.37	4.94	200	150	244	171	1940	245	1	1	1	2	1	2
	6.3 †	30.3	38.5	2087	937	7.36	4.93	209	156	255	178	2025	256	1	1	1	2	1	2
	8.0 †	37.9	48.3	2564	1140	7.28	4.86	256	190	316	220	2491	310	1	1	1	1	1	1
	10.0 †	46.7	59.5	3079	1356	7.19	4.77	308	226	384	266	2997	367	1	1	1	1	1	1
	12.5 †	57.3	73.0	3658	1589	7.08	4.67	366	265	464	319	3567	429	1	1	1	1	1	1
200x150	5.0 †	26.6	33.9	1984	1272	7.65	6.13	198	170	235	193	2383	267	3	1	3	4	2	4
	6.3 †	33.2	42.3	2442	1561	7.60	6.07	244	208	292	239	2943	326	1	1	1	2	1	2
	8.0 †	41.7	53.1	3006	1914	7.52	6.00	301	255	362	296	3638	398	1	1	1	1	1	1
	10.0 †	51.4	65.5	3621	2293	7.43	5.92	362	306	441	360	4403	475	1	1	1	1	1	1
	12.5 †	63.2	80.5	4318	2717	7.32	5.81	432	362	534	434	5281	560	1	1	1	1	1	1
	16.0 †	78.9	101	5166	3221	7.17	5.66	517	429	652	528	6368	659	1	1	1	1	1	1
250x100	6.3 †	33.2	42.3	3242	756	8.75	4.23	259	151	328	171	1981	264	3	1	3	4	1	4
	8.0 †	41.7	53.1	3995	917	8.67	4.15	320	183	408	210	2427	319	1	1	1	2	1	2
	10.0 †	51.4	65.5	4818	1084	8.58	4.07	385	217	498	254	2905	377	1	1	1	1	1	1
	12.5 †	63.2	80.5	5754	1263	8.45	3.96	460	253	603	304	3435	438	1	1	1	1	1	1
	16.0 †	78.9	101	6895	1461	8.28	3.81	552	292	736	364	4054	506	1	1	1	1	1	1
250x150	5.0 †	30.5	38.9	3382	1535	9.33	6.28	271	205	326	229	3275	337	4	1	4	4	2	4
	6.3	38.2	48.6	4178	1886	9.27	6.23	334	252	405	284	4049	413	3	1	3	4	1	4
	8.0	48.0	61.1	5167	2317	9.19	6.16	413	309	505	353	5014	506	1	1	1	2	1	2
	10.0	59.3	75.5	6259	2784	9.10	6.07	501	371	618	430	6082	606	1	1	1	1	1	1
	12.5	73.0	93.0	7518	3310	8.99	5.97	601	441	751	520	7317	717	1	1	1	1	1	1
	16.0	91.5	117	9089	3943	8.83	5.82	727	526	924	635	8863	851	1	1	1	1	1	1

y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

RECTANGULAR HOLLOW SECTIONS



DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

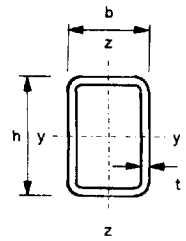
Section Designation		Mass per Metre	Area of Section	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		EC 3 Classification					
														S 275			S 355		
Size	Thick-ness			Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z			Comp only	Bending only		Comp only	Bending only	
h x b	t		A	I_y	I_z	i_y	i_z	$W_{el.y}$	$W_{el.z}$	$W_{pl.y}$	$W_{pl.z}$	I_t	C_t						
mm.mm	mm	kg/m	cm^2	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3		y - y	z - z		y - y	z - z
260x140	6.3 †	38.2	48.6	4392	1671	9.50	5.86	338	239	414	269	3798	399	3	1	3	4	1	4
	8.0 †	48.0	61.1	5434	2049	9.43	5.79	418	293	516	334	4698	488	1	1	1	2	1	2
	10.0 †	59.3	75.5	6583	2457	9.34	5.70	506	351	631	406	5691	584	1	1	1	1	1	1
	12.5 †	73.0	93.0	7909	2914	9.22	5.60	608	416	767	490	6833	690	1	1	1	1	1	1
	16.0 †	91.5	117	9565	3460	9.06	5.45	736	494	944	598	8253	817	1	1	1	1	1	1
300x100	6.3 †	38.2	48.6	5162	895	10.3	4.29	344	179	442	200	2501	319	4	1	4	4	1	4
	8.0 †	48.0	61.1	6386	1087	10.2	4.22	426	217	551	247	3066	387	2	1	2	4	1	4
	10.0 †	59.3	75.5	7738	1288	10.1	4.13	516	258	674	299	3673	458	1	1	1	2	1	2
	12.5 †	73.0	93.0	9295	1504	10.0	4.02	620	301	819	358	4348	534	1	1	1	1	1	1
	16.0 †	91.5	117	11240	1747	9.82	3.87	749	349	1008	431	5142	620	1	1	1	1	1	1
300x200	6.3	48.1	61.2	7880	4216	11.3	8.30	525	422	627	475	8468	681	4	1	4	4	2	4
	8.0	60.5	77.1	9798	5219	11.3	8.23	653	522	785	593	10550	840	2	1	2	4	1	4
	10.0	75.0	95.5	11940	6331	11.2	8.14	796	633	964	726	12890	1016	1	1	1	2	1	2
	12.5	92.6	118	14460	7619	11.1	8.04	964	762	1179	886	15650	1217	1	1	1	1	1	1
	16.0	117	149	17700	9239	10.9	7.89	1180	924	1462	1094	19230	1469	1	1	1	1	1	1
300x250	6.3 †	53.0	67.5	9239	6984	11.7	10.2	616	559	720	636	12140	862	4	3	4	4	4	4
	8.0 †	66.8	85.1	11500	8682	11.6	10.1	767	695	902	796	15170	1067	2	1	2	4	2	4
	10.0 †	82.8	106	14050	10580	11.5	10.0	937	847	1109	978	18600	1295	1	1	1	2	1	2
	12.5 †	102	130	17050	12810	11.4	9.91	1137	1025	1358	1196	22680	1561	1	1	1	1	1	1
	16.0 †	129	165	20930	15670	11.3	9.76	1395	1254	1689	1485	28020	1898	1	1	1	1	1	1
350x150	6.3 †	48.1	61.2	9551	2537	12.5	6.44	546	338	680	375	6383	587	4	1	4	4	1	4
	8.0 †	60.5	77.1	11880	3125	12.4	6.36	679	417	851	467	7917	721	4	1	4	4	1	4
	10.0 †	75.0	95.5	14490	3766	12.3	6.28	828	502	1045	570	9622	867	2	1	2	3	1	3
	12.5 †	92.6	118	17560	4495	12.2	6.17	1003	599	1278	692	11610	1033	1	1	1	1	1	1
	16.0 †	117	149	21500	5386	12.0	6.02	1229	718	1586	850	14110	1235	1	1	1	1	1	1
350x250	8.0 †	73.1	93.1	16560	9854	13.3	10.3	946	788	1124	892	19010	1255	4	1	4	4	2	4
	10.0 †	90.7	116	20270	12020	13.2	10.2	1158	962	1385	1098	23330	1526	2	1	2	3	1	3
	12.5 †	112	143	24680	14580	13.1	10.1	1410	1166	1700	1345	28490	1843	1	1	1	1	1	1
	16.0 †	142	181	30440	17860	13.0	9.95	1739	1429	2121	1672	35280	2248	1	1	1	1	1	1
400x150	6.3 †	53.0	67.5	13350	2863	14.1	6.51	667	382	841	420	7588	673	4	1	4	4	2	4
	8.0 †	66.8	85.1	16630	3528	14.0	6.44	832	470	1054	524	9415	828	4	1	4	4	1	4
	10.0 †	82.8	106	20340	4257	13.9	6.35	1017	568	1297	640	11450	998	3	1	3	4	1	4
	12.5 †	102	130	24720	5087	13.8	6.24	1236	678	1589	778	13820	1191	1	1	1	2	1	2
	16.0 †	129	165	30400	6108	13.6	6.09	1520	814	1978	957	16810	1427	1	1	1	1	1	1
400x200	6.3 †	57.9	73.8	15790	5398	14.6	8.55	789	540	965	597	12600	917	4	1	4	4	2	4
	8.0	73.1	93.1	19710	6695	14.5	8.48	985	669	1210	746	15720	1135	4	1	4	4	1	4
	10.0	90.7	116	24140	8138	14.5	8.39	1207	814	1492	916	19240	1377	3	1	3	4	1	4
	12.5	112	143	29410	9820	14.3	8.29	1471	982	1831	1120	23410	1657	1	1	1	2	1	2
	16.0	142	181	36300	11950	14.2	8.14	1815	1195	2285	1388	28840	2011	1	1	1	1	1	1
400x300	10.0 †	106	136	31750	20360	15.3	12.3	1587	1357	1882	1544	38140	2136	3	1	3	4	2	4
	12.5 †	132	168	38800	24800	15.2	12.2	1940	1654	2316	1898	46750	2593	1	1	1	2	1	2
	16.0 †	167	213	48100	30620	15.0	12.0	2405	2041	2899	2371	58200	3186	1	1	1	1	1	1

y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

RECTANGULAR HOLLOW SECTIONS



DIMENSIONS, PROPERTIES AND EC 3 CLASSIFICATION

Section Designation		Mass per	Area of	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		EC 3 Classification					
														S 275			S 355		
Size	Thick-ness	Metre	Section	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z	Axis y - y	Axis z - z			Comp only	Bending only		Comp only	Bending only	
h x b	t		A	I_y	I_z	i_y	i_z	$W_{el,y}$	$W_{el,z}$	$W_{pl,y}$	$W_{pl,z}$	I_t	C_t						
mm.mm	mm	kg/m	cm^2	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3		y - y	z - z		y - y	z - z
450x250	8.0 †	85.7	109	30270	12200	16.7	10.6	1345	976	1630	1086	27060	1629	4	1	4	4	2	4
	10.0	106	136	37180	14900	16.6	10.5	1653	1192	2013	1338	33250	1986	4	1	4	4	1	4
	12.5	132	168	45470	18100	16.5	10.4	2021	1448	2478	1642	40670	2407	2	1	2	3	1	3
	16.0	167	213	56420	22250	16.3	10.2	2508	1780	3103	2047	50480	2948	1	1	1	1	1	1
500x200	8.0 †	85.7	109	34270	8170	17.7	8.65	1371	817	1716	900	21100	1430	4	1	4	4	2	4
	10.0 †	106	136	42110	9945	17.6	8.57	1684	994	2119	1106	25840	1738	4	1	4	4	1	4
	12.5 †	132	168	51510	12020	17.5	8.46	2060	1202	2609	1354	31480	2097	3	1	3	4	1	4
	16.0 †	167	213	63930	14670	17.3	8.31	2557	1467	3267	1683	38830	2554	1	1	1	2	1	2
500x300	10.0	122	156	54120	24560	18.7	12.6	2165	1638	2609	1834	52400	2696	4	1	4	4	2	4
	12.5	152	193	66360	29970	18.5	12.5	2655	1998	3218	2257	64310	3282	3	1	3	4	1	4
	16.0	192	245	82670	37080	18.4	12.3	3307	2472	4042	2825	80220	4046	1	1	1	2	1	2
	20.0 ∇	237	302	100100	44550	18.2	12.1	4006	2970	4942	3442	97310	4845	1	1	1	1	1	1

y - y is the major axis and z - z is the minor axis.

∇ Sections marked thus are normally available in grade S 355 only.

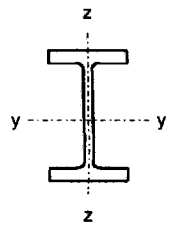
† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTES 2 AND 3.

Member resistances
Steel grade S 275

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



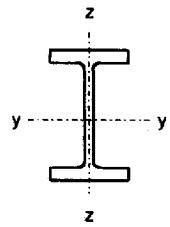
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation	Class	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Cross section resistance (kN)		Axis	Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
127x76x13	1	y	431	421	409	395	377	355	329	298	265	234	206	181	160
$N_{c.Rd}$ = 433		z	356	275	195	138	101	76.7	60.1	48.3	39.6	33.1	28.0	24.0	20.8
152x89x16	1	y	**532**	524	513	500	485	468	446	421	391	358	325	293	263
$N_{c.Rd}$ = 532		z	459	378	286	210	157	120	94.5	76.2	62.7	52.4	44.5	38.2	33.2
178x102x19	2	y	**635**	631	620	608	595	579	562	541	516	488	456	422	388
$N_{c.Rd}$ = 635		z	566	488	391	299	228	177	140	114	93.8	78.6	66.8	57.5	50.0
203x102x23	2	y	**770**	769	758	745	732	717	701	682	660	634	605	573	538
$N_{c.Rd}$ = 770		z	685	589	472	360	274	212	168	136	113	94.3	80.2	69.0	59.9
203x133x25	1	y	**837**	**837**	824	811	797	781	763	743	720	693	662	628	591
$N_{c.Rd}$ = 837		z	785	718	636	538	441	358	291	240	200	169	144	125	109
203x133x30	1	y	**1000**	**1000**	986	971	954	936	916	892	866	835	800	760	717
$N_{c.Rd}$ = 1000		z	941	865	769	657	542	442	361	298	249	210	180	155	136
254x102x22	4	y	**714**	**714**	710	701	691	681	670	658	645	630	613	594	572
$N_{c.Rd}$ = 714		z	615	506	382	280	208	160	126	101	83.4	69.8	59.2	50.8	44.1
254x102x25	3	y	**839**	**839**	835	824	813	802	789	775	760	742	723	701	677
$N_{c.Rd}$ = 839		z	729	607	465	344	257	198	156	126	104	86.6	73.5	63.2	54.9
254x102x28	3	y	**945**	**945**	941	930	917	905	891	876	859	841	820	796	770
$N_{c.Rd}$ = 945		z	828	698	543	406	305	235	186	150	124	104	88.0	75.6	65.7
254x146x31	3	y	**1040**	**1040**	1030	1020	1010	995	980	963	945	925	902	876	847
$N_{c.Rd}$ = 1040		z	985	912	823	715	601	497	409	340	285	241	207	179	156
254x146x37	2	y	**1240**	**1240**	1230	1220	1200	1190	1170	1150	1130	1110	1080	1050	1020
$N_{c.Rd}$ = 1240		z	1180	1090	994	873	743	619	513	427	359	305	262	227	198
254x146x43	1	y	**1430**	**1430**	**1430**	1410	1400	1380	1360	1340	1310	1290	1260	1230	1190
$N_{c.Rd}$ = 1430		z	1370	1270	1160	1020	872	729	605	505	425	361	310	269	235
305x102x25	4	y	**759**	**759**	**759**	753	746	737	729	719	710	699	687	674	660
$N_{c.Rd}$ = 759		z	650	531	398	290	216	165	130	105	86.1	72.0	61.1	52.5	45.5
305x102x28	4	y	**877**	**877**	**877**	872	863	853	844	833	822	810	797	783	768
$N_{c.Rd}$ = 877		z	762	634	486	359	269	207	163	131	108	90.5	76.8	66.0	57.3
305x102x33	4	y	**1050**	**1050**	**1050**	**1050**	1040	1020	1010	1000	987	973	958	941	922
$N_{c.Rd}$ = 1050		z	919	771	596	444	334	257	203	164	135	113	95.8	82.3	71.5
305x127x37	3	y	**1240**	**1240**	**1240**	1230	1210	1200	1190	1170	1150	1140	1120	1100	1070
$N_{c.Rd}$ = 1240		z	1130	1000	846	677	531	418	335	273	226	190	162	139	121
305x127x42	2	y	**1400**	**1400**	**1400**	1390	1370	1360	1340	1330	1310	1290	1270	1240	1220
$N_{c.Rd}$ = 1400		z	1280	1140	966	776	610	482	386	315	261	219	187	161	140
305x127x48	1	y	**1600**	**1600**	**1600**	1590	1580	1560	1540	1520	1500	1480	1450	1430	1400
$N_{c.Rd}$ = 1600		z	1470	1320	1120	908	717	567	455	372	308	259	221	190	166

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



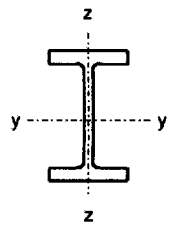
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
305x165x40	4	y	**1290**	**1290**	**1290**	**1290**	1270	1260	1250	1230	1220	1200	1180	1160	1140
$N_{c.Rd}$ = 1290		z	1250	1180	1090	990	873	752	639	541	460	394	340	296	259
305x165x46	4	y	**1510**	**1510**	**1510**	1500	1490	1470	1460	1440	1420	1400	1380	1360	1340
$N_{c.Rd}$ = 1510		z	1460	1380	1280	1160	1020	880	748	634	539	461	398	346	304
305x165x54	2	y	**1800**	**1800**	**1800**	1790	1780	1760	1740	1720	1700	1670	1650	1620	1590
$N_{c.Rd}$ = 1800		z	1740	1640	1520	1380	1220	1050	889	753	640	548	473	411	361
356x127x33	4	y	**999**	**999**	**999**	**999**	991	982	973	964	954	943	932	920	907
$N_{c.Rd}$ = 999		z	915	817	692	557	439	347	278	227	188	158	135	116	101
356x127x39	4	y	**1220**	**1220**	**1220**	**1220**	1210	1200	1190	1180	1160	1150	1140	1120	1110
$N_{c.Rd}$ = 1220		z	1120	1000	859	698	553	438	352	288	239	201	171	148	129
356x171x45	4	y	**1430**	**1430**	**1430**	**1430**	1420	1410	1390	1380	1370	1350	1340	1320	1300
$N_{c.Rd}$ = 1430		z	1380	1300	1200	1080	948	812	687	580	492	421	363	315	276
356x171x51	4	y	**1640**	**1640**	**1640**	**1640**	1630	1620	1600	1590	1570	1560	1540	1520	1500
$N_{c.Rd}$ = 1640		z	1590	1490	1390	1260	1110	954	810	686	583	499	431	375	329
356x171x57	3	y	**1900**	**1900**	**1900**	**1900**	1890	1870	1850	1840	1820	1800	1780	1750	1730
$N_{c.Rd}$ = 1900		z	1840	1730	1600	1450	1280	1100	931	788	669	572	494	430	377
356x171x67	2	y	**2240**	**2240**	**2240**	**2240**	2220	2210	2190	2170	2140	2120	2100	2070	2040
$N_{c.Rd}$ = 2240		z	2170	2040	1900	1730	1530	1320	1130	957	815	699	603	525	461
406x140x39	4	y	**1140**	**1140**	**1140**	**1140**	**1140**	1130	1130	1120	1110	1100	1090	1080	1070
$N_{c.Rd}$ = 1140		z	1070	978	862	727	593	480	390	321	267	226	193	167	145
406x140x46	4	y	**1390**	**1390**	**1390**	**1390**	**1390**	1380	1370	1360	1350	1340	1320	1310	1300
$N_{c.Rd}$ = 1390		z	1310	1200	1070	916	757	617	504	416	347	294	251	217	190
406x178x54	4	y	**1690**	**1690**	**1690**	**1690**	**1690**	1680	1670	1650	1640	1630	1610	1590	1580
$N_{c.Rd}$ = 1690		z	1640	1540	1430	1300	1150	995	848	719	612	525	453	394	346
406x178x60	4	y	**1900**	**1900**	**1900**	**1900**	**1900**	1890	1870	1860	1840	1830	1810	1790	1770
$N_{c.Rd}$ = 1900		z	1840	1740	1620	1480	1320	1150	982	836	714	613	530	462	405
406x178x67	4	y	**2170**	**2170**	**2170**	**2170**	**2170**	2160	2140	2120	2110	2090	2070	2050	2030
$N_{c.Rd}$ = 2170		z	2110	1990	1850	1690	1500	1310	1120	951	811	696	602	524	460
406x178x74	3	y	**2480**	**2480**	**2480**	**2480**	2470	2450	2440	2420	2400	2380	2350	2330	2310
$N_{c.Rd}$ = 2480		z	2400	2270	2110	1920	1710	1480	1270	1080	920	789	682	594	521
457x152x52	4	y	**1560**	**1560**	**1560**	**1560**	**1560**	1550	1540	1530	1520	1510	1500	1490	1470
$N_{c.Rd}$ = 1560		z	1470	1360	1220	1060	882	724	595	493	413	349	299	259	226
457x152x60	4	y	**1830**	**1830**	**1830**	**1830**	**1830**	1820	1810	1800	1790	1770	1760	1740	1730
$N_{c.Rd}$ = 1830		z	1730	1610	1450	1260	1060	879	725	602	505	428	367	318	277
457x152x67	4	y	**2110**	**2110**	**2110**	**2110**	**2110**	2100	2090	2080	2060	2040	2030	2010	2000
$N_{c.Rd}$ = 2110		z	2000	1850	1670	1450	1220	1010	834	692	580	492	422	365	319
457x152x74	4	y	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	2350	2330	2320	2300	2280	2260	2240
$N_{c.Rd}$ = 2370		z	2250	2090	1890	1650	1390	1150	951	790	663	563	482	418	365
457x152x82	3	y	**2740**	**2740**	**2740**	**2740**	**2740**	2730	2710	2690	2670	2650	2630	2610	2590
$N_{c.Rd}$ = 2740		z	2600	2400	2170	1890	1590	1310	1080	898	753	638	547	474	414

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



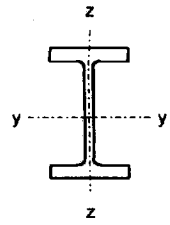
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation	Class	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)												
		Axis	Buckling length in metres											
Cross section resistance (kN)			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
457x191x67	4	y	**2090**	**2090**	**2090**	**2090**	**2090**	2080	2070	2050	2040	2020	2010	1990	1980
$N_{c.Rd}$ = 2090		z	2030	1930	1810	1660	1500	1320	1140	982	843	727	630	550	484
457x191x74	4	y	**2350**	**2350**	**2350**	**2350**	**2350**	2340	2330	2310	2300	2280	2260	2240	2230
$N_{c.Rd}$ = 2350		z	2290	2170	2040	1880	1700	1500	1300	1120	965	832	722	631	555
457x191x82	4	y	**2650**	**2650**	**2650**	**2650**	**2650**	2640	2630	2610	2590	2570	2550	2530	2510
$N_{c.Rd}$ = 2650		z	2590	2450	2300	2120	1910	1690	1460	1260	1080	933	810	707	622
457x191x89	3	y	**2980**	**2980**	**2980**	**2980**	**2980**	2970	2950	2930	2910	2890	2870	2840	2820
$N_{c.Rd}$ = 2980		z	2910	2760	2580	2380	2150	1890	1640	1410	1210	1040	905	791	695
457x191x98	3	y	**3280**	**3280**	**3280**	**3280**	**3280**	3270	3250	3230	3210	3180	3160	3130	3110
$N_{c.Rd}$ = 3280		z	3200	3040	2850	2630	2380	2100	1830	1570	1350	1170	1010	886	779
533x210x82	4	y	**2520**	**2520**	**2520**	**2520**	**2520**	**2520**	2510	2500	2480	2470	2450	2440	2420
$N_{c.Rd}$ = 2520		z	2470	2350	2220	2070	1890	1690	1490	1300	1120	975	850	745	657
533x210x92	4	y	**2870**	**2870**	**2870**	**2870**	**2870**	**2870**	**2870**	2850	2840	2820	2800	2790	2770
$N_{c.Rd}$ = 2870		z	2830	2690	2550	2380	2180	1970	1740	1520	1320	1150	1000	881	777
533x210x101	4	y	**3210**	**3210**	**3210**	**3210**	**3210**	**3210**	3200	3180	3170	3150	3130	3110	3090
$N_{c.Rd}$ = 3210		z	3150	3010	2850	2660	2440	2200	1950	1710	1480	1290	1130	991	874
533x210x109	4	y	**3520**	**3520**	**3520**	**3520**	**3520**	**3520**	3510	3490	3470	3450	3430	3410	3390
$N_{c.Rd}$ = 3520		z	3460	3300	3120	2920	2680	2410	2140	1870	1620	1410	1230	1080	956
533x210x122	3	y	**4070**	**4070**	**4070**	**4070**	**4070**	**4070**	4060	4040	4020	3990	3970	3940	3910
$N_{c.Rd}$ = 4070		z	4000	3820	3610	3370	3100	2790	2460	2150	1870	1630	1420	1250	1100
610x229x101	4	y	**3050**	**3050**	**3050**	**3050**	**3050**	**3050**	**3050**	**3050**	3030	3020	3000	2990	2970
$N_{c.Rd}$ = 3050		z	3020	2890	2750	2590	2410	2200	1980	1750	1540	1350	1190	1050	928
610x229x113	4	y	**3480**	**3480**	**3480**	**3480**	**3480**	**3480**	**3480**	3470	3460	3440	3420	3400	3390
$N_{c.Rd}$ = 3480		z	3440	3300	3140	2970	2760	2530	2290	2030	1790	1580	1390	1230	1090
610x229x125	4	y	**3930**	**3930**	**3930**	**3930**	**3930**	**3930**	**3930**	3920	3900	3880	3860	3840	3820
$N_{c.Rd}$ = 3930		z	3890	3730	3560	3360	3130	2870	2600	2310	2040	1800	1590	1400	1240
610x229x140	4	y	**4500**	**4500**	**4500**	**4500**	**4500**	**4500**	**4500**	4490	4470	4450	4430	4400	4380
$N_{c.Rd}$ = 4500		z	4460	4270	4070	3850	3590	3290	2970	2650	2340	2060	1820	1600	1420

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



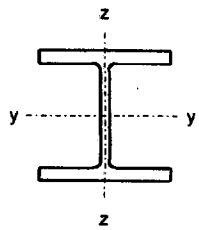
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation	Class	Design (UK) buckling resistance of compression member $N_{b,Rd}$ (kN)												
		Axis	Buckling length in metres											
Cross section resistance (kN)			2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
610x305x149	4	y	**4740**	**4740**	**4740**	4720	4670	4630	4580	4520	4470	4410	4340	4270	4200
$N_{c,Rd}$ = 4740		z	4530	4230	3860	3420	2940	2470	2060	1720	1450	1230	1060	919	804
610x305x179	3	y	**5970**	**5970**	**5970**	5940	5880	5820	5760	5690	5620	5540	5460	5360	5260
$N_{c,Rd}$ = 5970		z	5700	5310	4840	4270	3650	3060	2540	2120	1790	1520	1300	1130	988
610x305x238	1	y	**7940**	**7940**	**7940**	7910	7830	7750	7670	7580	7490	7390	7280	7160	7030
$N_{c,Rd}$ = 7940		z	7600	7100	6500	5770	4960	4180	3490	2920	2460	2090	1800	1560	1370
686x254x125	4	y	**3760**	**3760**	**3760**	**3760**	3730	3690	3660	3620	3580	3540	3500	3450	3400
$N_{c,Rd}$ = 3760		z	3460	3100	2640	2140	1700	1340	1080	882	731	615	525	452	394
686x254x140	4	y	**4300**	**4300**	**4300**	**4300**	4260	4220	4180	4140	4100	4050	4000	3950	3890
$N_{c,Rd}$ = 4300		z	3960	3570	3060	2500	1990	1580	1270	1040	862	726	619	533	465
686x254x152	4	y	**4760**	**4760**	**4760**	**4760**	4720	4670	4630	4580	4530	4480	4430	4370	4300
$N_{c,Rd}$ = 4760		z	4390	3950	3400	2780	2210	1760	1420	1160	961	809	690	595	518
686x254x170	4	y	**5450**	**5450**	**5450**	**5450**	5400	5350	5300	5240	5190	5130	5060	4990	4920
$N_{c,Rd}$ = 5450		z	5030	4530	3890	3180	2530	2020	1620	1330	1100	927	791	682	594
762x267x134	4	y	**3890**	**3890**	**3890**	**3890**	3880	3850	3810	3780	3750	3710	3670	3630	3590
$N_{c,Rd}$ = 3890		z	3590	3240	2790	2290	1820	1450	1170	956	794	669	571	492	429
762x267x147	4	y	**4370**	**4370**	**4370**	**4370**	4350	4320	4280	4240	4210	4170	4120	4080	4030
$N_{c,Rd}$ = 4370		z	4040	3650	3150	2590	2070	1650	1330	1090	904	761	649	560	488
762x267x173	4	y	**5340**	**5340**	**5340**	**5340**	5320	5270	5230	5180	5140	5090	5030	4980	4920
$N_{c,Rd}$ = 5340		z	4950	4480	3880	3210	2570	2060	1660	1360	1130	953	814	702	611
762x267x197	4	y	**6230**	**6230**	**6230**	**6230**	6210	6150	6100	6050	5990	5940	5880	5810	5740
$N_{c,Rd}$ = 6230		z	5790	5250	4570	3790	3050	2440	1980	1620	1350	1140	969	836	729
838x292x176	4	y	**5200**	**5200**	**5200**	**5200**	**5200**	5160	5130	5090	5050	5010	4960	4920	4870
$N_{c,Rd}$ = 5200		z	4880	4470	3970	3370	2770	2250	1840	1510	1260	1070	914	789	689
838x292x194	4	y	**5840**	**5840**	**5840**	**5840**	**5840**	5810	5760	5720	5670	5630	5580	5530	5480
$N_{c,Rd}$ = 5840		z	5500	5050	4500	3850	3180	2600	2120	1750	1460	1240	1060	915	799
838x292x226	4	y	**7040**	**7040**	**7040**	**7040**	**7040**	7000	6950	6900	6840	6790	6730	6670	6600
$N_{c,Rd}$ = 7040		z	6640	6120	5480	4720	3930	3220	2640	2180	1820	1540	1320	1140	998
914x305x201	4	y	**5910**	**5910**	**5910**	**5910**	**5910**	5900	5860	5820	5780	5730	5690	5640	5600
$N_{c,Rd}$ = 5910		z	5580	5140	4590	3940	3270	2680	2190	1810	1520	1280	1100	949	828
914x305x224	4	y	**6750**	**6750**	**6750**	**6750**	**6750**	6730	6690	6640	6600	6550	6500	6450	6390
$N_{c,Rd}$ = 6750		z	6380	5900	5300	4580	3830	3150	2590	2140	1800	1520	1300	1130	984
914x305x253	4	y	**7840**	**7840**	**7840**	**7840**	**7840**	7820	7770	7710	7660	7600	7540	7480	7420
$N_{c,Rd}$ = 7840		z	7420	6870	6180	5360	4500	3710	3050	2530	2120	1800	1540	1330	1160
914x305x289	4	y	**9240**	**9240**	**9240**	**9240**	**9240**	9210	9150	9080	9020	8950	8880	8810	8730
$N_{c,Rd}$ = 9240		z	8740	8080	7280	6310	5290	4350	3580	2970	2490	2110	1810	1560	1360
914x419x343	4	y	**11100**	**11100**	**11100**	**11100**	**11100**	**11100**	11000	10900	10900	10800	10700	10600	10500
$N_{c,Rd}$ = 11100		z	11000	10500	9930	9310	8590	7780	6920	6090	5320	4640	4060	3570	3160
914x419x388	3	y	**12900**	**12900**	**12900**	**12900**	**12900**	**12900**	12800	12700	12600	12600	12500	12400	12300
$N_{c,Rd}$ = 12900		z	12800	12200	11600	10800	9990	9050	8050	7070	6180	5390	4720	4150	3670

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c,Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UC SECTIONS SUBJECT TO AXIAL COMPRESSION



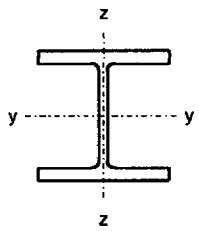
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
152x152x23	3	y	**766**	748	723	697	667	635	598	558	516	472	430	390	353
$N_{c.Rd}$ = 766		z	723	660	591	517	443	375	316	267	227	195	169	147	129
152x152x30	1	y	**1000**	982	951	918	881	841	796	746	693	639	584	532	483
$N_{c.Rd}$ = 1000		z	951	872	786	693	599	511	433	367	314	270	234	204	180
152x152x37	1	y	**1230**	1210	1170	1130	1090	1040	986	926	862	796	730	666	605
$N_{c.Rd}$ = 1230		z	1170	1080	973	861	746	637	541	460	393	338	293	256	226
203x203x46	2	y	**1540**	**1540**	1500	1470	1430	1390	1340	1300	1250	1190	1130	1070	1000
$N_{c.Rd}$ = 1540		z	1520	1430	1340	1240	1140	1030	925	822	727	643	569	505	450
203x203x52	1	y	**1740**	**1740**	1700	1660	1620	1570	1520	1470	1410	1350	1280	1210	1140
$N_{c.Rd}$ = 1740		z	1720	1620	1520	1410	1290	1170	1050	936	830	734	650	578	515
203x203x60	1	y	**2000**	**2000**	1960	1910	1860	1810	1760	1700	1630	1560	1480	1400	1320
$N_{c.Rd}$ = 2000		z	1980	1870	1750	1620	1490	1360	1220	1080	960	850	753	670	597
203x203x71	1	y	**2370**	**2370**	2330	2270	2220	2160	2090	2020	1950	1870	1780	1690	1600
$N_{c.Rd}$ = 2370		z	2350	2220	2080	1940	1790	1630	1460	1310	1160	1030	916	815	728
203x203x86	1	y	**2870**	**2870**	2820	2760	2690	2620	2540	2460	2370	2280	2180	2070	1960
$N_{c.Rd}$ = 2870		z	2850	2690	2530	2360	2170	1980	1790	1600	1420	1260	1120	1000	894
254x254x73	1	y	**2440**	**2440**	2430	2390	2340	2290	2240	2190	2130	2070	2010	1940	1870
$N_{c.Rd}$ = 2440		z	**2440**	2360	2240	2130	2010	1880	1750	1610	1480	1350	1220	1110	1010
254x254x89	1	y	**2970**	**2970**	2960	2910	2850	2800	2740	2670	2610	2540	2460	2380	2290
$N_{c.Rd}$ = 2970		z	**2970**	2870	2740	2600	2460	2300	2140	1980	1820	1660	1510	1370	1240
254x254x107	1	y	**3570**	**3570**	**3570**	3500	3440	3370	3300	3220	3150	3060	2970	2880	2780
$N_{c.Rd}$ = 3570		z	**3570**	3460	3300	3130	2960	2780	2590	2400	2200	2010	1830	1660	1510
254x254x132	1	y	**4400**	**4400**	**4400**	4330	4250	4170	4080	3990	3900	3800	3690	3580	3460
$N_{c.Rd}$ = 4400		z	**4400**	4270	4080	3880	3670	3450	3220	2990	2750	2520	2300	2090	1900
254x254x167	1	y	**5570**	**5570**	**5570**	5490	5390	5290	5190	5080	4970	4840	4720	4580	4430
$N_{c.Rd}$ = 5570		z	**5570**	5420	5180	4930	4680	4400	4120	3830	3530	3240	2960	2700	2460

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UC SECTIONS SUBJECT TO AXIAL COMPRESSION



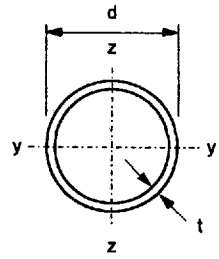
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Designation	Class	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)												
		Axis	Buckling length in metres											
Cross section resistance (kN)			2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
305x305x97	2	y	**3230**	3170	3070	2960	2840	2710	2560	2400	2220	2050	1870	1700	1540
$N_{c.Rd}$ = 3230		z	3070	2820	2540	2250	1940	1660	1410	1190	1020	877	761	665	585
305x305x118	1	y	**3930**	3860	3740	3600	3460	3300	3130	2940	2730	2520	2300	2100	1910
$N_{c.Rd}$ = 3930		z	3740	3440	3110	2750	2380	2040	1730	1470	1260	1080	940	822	723
305x305x137	1	y	**4570**	4480	4340	4190	4030	3850	3650	3430	3200	2950	2700	2470	2250
$N_{c.Rd}$ = 4570		z	4350	4000	3620	3210	2790	2390	2030	1730	1480	1280	1110	968	852
305x305x158	1	y	**5270**	5180	5020	4850	4670	4460	4240	3990	3720	3440	3160	2890	2630
$N_{c.Rd}$ = 5270		z	5030	4630	4190	3730	3250	2790	2370	2020	1730	1490	1300	1130	999
305x305x198	1	y	**6610**	6510	6310	6110	5880	5640	5370	5070	4740	4400	4060	3720	3400
$N_{c.Rd}$ = 6610		z	6320	5830	5300	4720	4130	3560	3040	2600	2230	1920	1670	1460	1290
305x305x240	1	y	**8010**	7900	7670	7420	7160	6870	6560	6210	5830	5430	5020	4610	4220
$N_{c.Rd}$ = 8010		z	7670	7080	6450	5770	5060	4370	3750	3210	2760	2380	2070	1810	1600
305x305x283	1	y	**9440**	9330	9060	8780	8480	8150	7790	7390	6960	6500	6030	5560	5110
$N_{c.Rd}$ = 9440		z	9060	8380	7650	6860	6040	5230	4500	3860	3320	2870	2500	2190	1930
356x368x129	3	y	**4300**	4270	4160	4040	3910	3780	3630	3460	3280	3090	2890	2690	2490
$N_{c.Rd}$ = 4300		z	4210	3940	3660	3350	3030	2700	2380	2090	1820	1600	1400	1240	1100
356x368x153	1	y	**5100**	5070	4930	4800	4650	4490	4310	4120	3910	3690	3450	3220	2980
$N_{c.Rd}$ = 5100		z	4990	4670	4340	3990	3610	3220	2840	2490	2180	1910	1680	1480	1320
356x368x177	1	y	**5910**	5870	5720	5560	5390	5200	5010	4790	4550	4290	4020	3750	3480
$N_{c.Rd}$ = 5910		z	5780	5420	5030	4630	4190	3740	3310	2900	2540	2230	1960	1730	1540
356x368x202	1	y	**6740**	6700	6530	6350	6160	5950	5730	5480	5210	4920	4620	4310	4000
$N_{c.Rd}$ = 6740		z	6600	6190	5750	5290	4800	4290	3790	3330	2920	2560	2250	1990	1770
356x406x235	1	y	**7840**	7810	7610	7400	7180	6950	6690	6410	6110	5780	5430	5080	4720
$N_{c.Rd}$ = 7840		z	7740	7280	6810	6320	5780	5230	4680	4150	3670	3240	2860	2540	2260
356x406x287	1	y	**9580**	9550	9310	9060	8800	8520	8220	7880	7520	7130	6720	6300	5870
$N_{c.Rd}$ = 9580		z	9460	8910	8350	7750	7110	6440	5770	5130	4540	4010	3550	3150	2810
356x406x340	1	y	**11300**	**11300**	11000	10800	10500	10100	9780	9400	8990	8540	8060	7570	7070
$N_{c.Rd}$ = 11300		z	11200	10600	9920	9210	8470	7690	6900	6150	5450	4820	4270	3800	3390
356x406x393	1	y	**13100**	**13100**	12800	12500	12100	11800	11400	10900	10500	9970	9440	8880	8310
$N_{c.Rd}$ = 13100		z	13000	12300	11500	10700	9850	8960	8060	7190	6380	5660	5020	4460	3990
356x406x467	1	y	**15600**	**15600**	15200	14900	14500	14000	13600	13100	12600	12000	11400	10800	10100
$N_{c.Rd}$ = 15600		z	15500	14600	13700	12800	11800	10800	9700	8680	7720	6860	6090	5430	4850
356x406x551	1	y	**17000**	**17000**	16800	16400	16000	15600	15100	14600	14100	13600	13000	12300	11700
$N_{c.Rd}$ = 17000		z	**17000**	16100	15200	14300	13300	12200	11100	10000	8990	8040	7180	6430	5760
356x406x634	1	y	**19600**	**19600**	19300	18900	18500	18000	17500	17000	16400	15800	15100	14400	13700
$N_{c.Rd}$ = 19600		z	**19600**	18600	17600	16500	15400	14200	12900	11700	10500	9430	8440	7560	6790

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

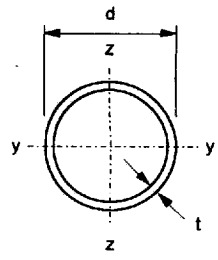
Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Outside Diameter d	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm	mm	kg/m		kN	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
21.3	3.2 Δ	1.43	1	47.7	13.2	6.22	3.58	2.32	1.62	1.20	0.921	0.730	0.593	0.491	0.413	0.353	0.304
26.9	3.2 Δ	1.87	1	62.4	27.3	13.4	7.77	5.06	3.55	2.63	2.02	1.61	1.31	1.08	0.911	0.778	0.672
33.7	2.6 Δ	1.99	1	66.5	42.2	23.0	13.7	8.99	6.34	4.71	3.63	2.89	2.35	1.95	1.64	1.40	1.21
	3.2 Δ	2.41	1	80.3	49.9	26.9	16.0	10.5	7.40	5.49	4.24	3.37	2.74	2.27	1.91	1.63	1.41
	4.0 Δ	2.93	1	97.7	59.1	31.5	18.7	12.2	8.62	6.39	4.93	3.92	3.19	2.64	2.23	1.90	1.64
42.4	2.6 Δ	2.55	1	85.1	66.9	43.8	27.4	18.3	13.0	9.67	7.48	5.96	4.85	4.03	3.40	2.91	2.51
	3.2 Δ	3.09	1	103	80.4	52.0	32.4	21.6	15.3	11.4	8.83	7.03	5.72	4.75	4.01	3.43	2.96
	4.0 Δ	3.79	1	126	97.3	61.9	38.3	25.5	18.1	13.5	10.4	8.30	6.76	5.61	4.73	4.05	3.50
48.3	3.2	3.56	1	119	99.5	72.3	47.3	32.0	22.9	17.1	13.3	10.6	8.64	7.18	6.06	5.18	4.48
	4.0	4.37	1	146	121	87.0	56.5	38.2	27.3	20.4	15.8	12.6	10.3	8.53	7.20	6.16	5.33
	5.0	5.34	1	178	147	104	66.7	45.0	32.1	24.0	18.6	14.8	12.1	10.0	8.46	7.23	6.26
60.3	3.2	4.51	1	150	135	115	85.6	61.1	44.6	33.7	26.3	21.0	17.2	14.3	12.1	10.4	8.98
	4.0	5.55	1	185	166	140	104	73.7	53.7	40.5	31.6	25.3	20.7	17.2	14.5	12.5	10.8
	5.0	6.82	1	228	204	170	124	88.0	64.0	48.3	37.6	30.1	24.6	20.5	17.3	14.8	12.8
76.1	3.2	5.75	1	192	180	165	142	112	86.1	66.6	52.6	42.4	34.9	29.1	24.7	21.2	18.4
	4.0	7.11	1	237	223	204	174	137	105	80.9	63.8	51.4	42.3	35.3	29.9	25.7	22.3
	5.0	8.77	1	293	274	250	212	166	126	97.5	76.8	61.9	50.8	42.5	36.0	30.9	26.8
88.9	3.2	6.76	1	226	216	203	185	158	128	102	82.2	66.9	55.3	46.4	39.4	33.9	29.4
	4.0	8.38	1	279	267	251	228	194	157	125	100	81.5	67.4	56.5	48.0	41.3	35.8
	5.0	10.3	1	345	330	310	279	237	191	152	121	98.7	81.5	68.3	58.0	49.9	43.3
114.3	3.6	9.83	1	328	321	309	293	272	244	211	179	150	126	107	91.8	79.4	69.3
	5.0	13.5	1	450	440	423	401	371	332	286	241	202	170	144	123	106	92.8
	6.3	16.8	1	560	547	525	498	460	410	351	295	247	207	176	150	130	113
139.7	5.0	16.6	1	554	549	533	515	492	463	426	382	335	291	252	218	191	167
	6.3	20.7	1	691	685	665	642	613	576	528	472	413	358	309	268	234	205
	8.0	26.0	1	867	858	833	803	766	718	656	584	510	441	381	330	287	252
	10.0	32.0	1	1070	1060	1020	986	939	878	799	709	616	531	458	396	345	302

Δ Sections marked thus are normally available in grade 275 only.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



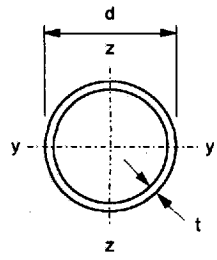
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Outside Diameter d	Thick-ness t	Metre		Resist. $N_{c.Rd}$	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
mm	mm	kg/m		kN													
168.3	5.0	20.1	1	672	640	598	535	449	358	282	225	183	151	126	107	92.0	79.9
	6.3	25.2	1	840	800	746	666	556	442	348	277	225	186	155	132	113	98.4
	8.0	31.6	1	1060	1000	935	832	691	547	430	343	278	229	192	163	140	121
	10.0	39.0	1	1300	1240	1150	1020	842	664	521	414	335	276	231	196	169	146
193.7	5.0	23.3	1	776	750	713	662	588	497	407	332	272	226	190	162	140	121
	6.3	29.1	1	971	939	891	826	733	618	505	411	337	280	235	200	173	150
	8.0	36.6	1	1220	1180	1120	1040	916	769	627	509	417	347	291	248	214	186
	10.0	45.3	1	1510	1460	1380	1280	1120	940	764	619	507	421	354	301	259	225
	12.5	55.9	1	1860	1800	1700	1560	1370	1140	924	748	611	507	426	362	312	271
	16.0 ♦	70.1	1	2340	2250	2130	1950	1700	1400	1130	911	744	616	517	440	379	329
219.1	5.0	26.4	2	881	860	826	781	720	639	546	457	382	320	271	232	200	175
	6.3	33.1	1	1100	1080	1030	977	899	796	679	568	473	397	336	287	248	216
	8.0	41.6	1	1390	1360	1300	1230	1130	996	848	707	589	494	418	357	308	269
	10.0	51.6	1	1720	1680	1610	1520	1390	1220	1040	864	718	602	509	435	375	327
	12.5	63.7	1	2120	2070	1980	1870	1710	1500	1260	1050	871	728	616	526	454	395
	16.0	80.1	1	2670	2600	2490	2340	2130	1850	1560	1290	1070	892	753	643	555	483
	20.0 ♦	98.2	1	3280	3180	3040	2850	2580	2230	1860	1540	1270	1060	893	762	657	572
244.5	6.3	37.0	1	1230	1210	1170	1120	1060	968	859	741	631	536	458	394	341	298
	8.0	46.7	1	1560	1530	1480	1410	1330	1210	1080	926	787	668	570	490	425	371
	10.0	57.8	1	1930	1900	1830	1750	1640	1500	1320	1140	964	818	697	599	519	453
	12.5	71.5	1	2390	2340	2260	2160	2020	1840	1620	1390	1170	995	847	728	630	550
	16.0	90.2	1	3010	2950	2840	2710	2530	2300	2010	1720	1450	1220	1040	894	774	676
	20.0 ♦	111	1	3690	3620	3490	3320	3090	2790	2430	2060	1740	1460	1240	1070	923	806
	25.0 †♦	135	1	4520	4420	4250	4040	3750	3360	2900	2450	2060	1730	1470	1260	1090	949
273.0	6.3	41.4	2	1380	1370	1330	1280	1220	1150	1050	942	825	714	618	536	467	410
	8.0	52.3	1	1740	1730	1680	1620	1540	1450	1320	1180	1030	893	772	669	583	511
	10.0	64.9	1	2160	2140	2080	2000	1910	1790	1640	1450	1270	1100	946	819	714	626
	12.5	80.3	1	2680	2650	2570	2480	2360	2210	2010	1780	1550	1340	1150	999	870	763
	16.0	101	1	3380	3340	3240	3120	2970	2770	2510	2220	1930	1660	1430	1230	1070	941
	20.0 ♦	125	1	4160	4110	3980	3830	3640	3380	3060	2690	2330	2000	1720	1480	1290	1130
	25.0 ♦	153	1	5100	5030	4870	4680	4430	4100	3690	3230	2780	2380	2040	1760	1530	1340

† Sections marked thus are not included in BS4848: Part 2.

♦ Check availabilty of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.



COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION

DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section Resist.	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Outside Diameter d	Thick-ness t	Metre		$N_{c.Rd}$	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
mm	mm	kg/m		kN													
323.9	6.3	49.3	2	1650	1640	1610	1560	1520	1460	1380	1290	1180	1070	950	841	744	660
	8.0	62.3	1	2080	**2080**	2030	1970	1910	1840	1740	1620	1490	1340	1190	1050	932	826
	10.0	77.4	1	2580	**2580**	2520	2450	2370	2280	2160	2010	1840	1650	1470	1300	1150	1020
	12.5	96.0	1	3200	**3200**	3120	3040	2940	2820	2670	2480	2260	2030	1800	1590	1400	1240
	16.0	121	1	4050	4040	3950	3840	3710	3550	3360	3120	2840	2540	2250	1980	1750	1550
	20.0 ♦	150	1	5000	4990	4860	4730	4570	4370	4120	3810	3460	3080	2720	2400	2110	1870
	25.0 ♦	184	1	6150	6130	5970	5800	5600	5340	5030	4640	4190	3720	3280	2880	2530	2240
355.6	8.0	68.6	2	2290	**2290**	2250	2190	2140	2070	1980	1880	1760	1620	1470	1330	1190	1060
	10.0	85.2	1	2840	**2840**	2790	2730	2650	2570	2460	2330	2180	2010	1820	1640	1460	1310
	12.5	106	1	3530	**3530**	3460	3380	3290	3180	3050	2890	2690	2470	2240	2010	1800	1600
	16.0	134	1	4470	**4470**	4380	4280	4160	4020	3850	3640	3390	3110	2810	2510	2240	2000
	20.0 ♦	166	1	5520	**5520**	5410	5280	5130	4950	4740	4470	4150	3790	3420	3060	2730	2430
	25.0 ♦	204	1	6800	**6800**	6660	6490	6300	6080	5800	5460	5060	4610	4140	3690	3290	2920
406.4	10.0	97.8	1	3260	**3260**	3230	3170	3100	3020	2930	2830	2700	2550	2390	2200	2020	1830
	12.5	121	1	4050	**4050**	4010	3930	3850	3750	3640	3500	3350	3160	2950	2720	2490	2260
	16.0	154	1	5140	**5140**	5080	4980	4870	4750	4610	4430	4230	3990	3710	3420	3120	2830
	20.0 ♦	191	1	6360	**6360**	6280	6160	6020	5870	5680	5470	5210	4900	4560	4190	3810	3460
	25.0 ♦	235	1	7850	**7850**	7750	7590	7420	7220	6990	6720	6390	6000	5560	5100	4630	4190
	32.0 ♦	295	1	9860	**9860**	9730	9530	9300	9050	8750	8390	7950	7450	6880	6280	5690	5140
457.0	10.0	110	2	3680	**3680**	3660	3600	3540	3470	3390	3300	3190	3070	2920	2760	2580	2400
	12.5	137	1	4570	**4570**	4550	4480	4400	4310	4210	4090	3960	3800	3620	3420	3190	2960
	16.0	174	1	5810	**5810**	5780	5680	5580	5460	5340	5190	5010	4810	4580	4310	4030	3730
	20.0 ♦	216	1	7190	**7190**	7150	7030	6900	6760	6600	6410	6190	5940	5640	5310	4950	4570
	25.0 ♦	266	1	8890	**8890**	8840	8680	8520	8340	8140	7900	7620	7300	6920	6500	6050	5580
	32.0 ♦	335	1	11200	**11200**	11100	10900	10700	10500	10200	9910	9550	9120	8630	8080	7500	6900
	40.0 ♦	411	1	13700	**13700**	13600	13400	13100	12800	12500	12100	11600	11100	10500	9770	9030	8290
508.0	10.0	123	2	4100	**4100**	**4100**	4040	3980	3910	3840	3760	3660	3560	3440	3300	3140	2960
	12.5	153	1	5100	**5100**	**5100**	5020	4950	4860	4770	4670	4550	4420	4260	4090	3890	3670
	16.0	194	1	6480	**6480**	**6480**	6380	6280	6180	6060	5930	5780	5600	5400	5180	4920	4640
	20.0 ♦	241	1	8030	**8030**	**8030**	7910	7790	7650	7500	7340	7150	6930	6680	6390	6060	5710
	25.0 ♦	298	1	9940	**9940**	9930	9780	9620	9460	9270	9060	8820	8540	8220	7860	7450	7000
	32.0 ♦	376	1	12500	**12500**	**12500**	12300	12100	11900	11700	11400	11100	10700	10300	9830	9300	8720
	40.0 ♦	462	1	15400	**15400**	**15400**	15100	14900	14600	14300	14000	13600	13100	12600	12000	11300	10600
	50.0 ♦	565	1	17500	**17500**	**17500**	17200	16900	16600	16300	15900	15500	15000	14400	13700	13000	12200

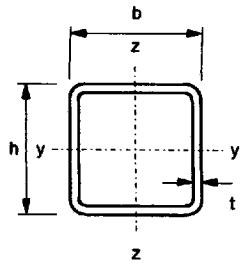
♦ Check availabilty of sections.

Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



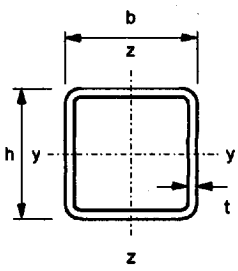
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size	Thick-ness	Metre		Resist.													
h x b	t			$N_{c.Rd}$													
mm.mm	mm	kg/m		kN	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
20x20	2.0	1.12	1	37.2	12.7	6.07	3.50	2.27	1.59	1.18	0.906	0.719	0.584	0.484	0.407	0.348	0.300
	2.5	1.35	1	45.0	14.6	6.94	4.00	2.60	1.82	1.34	1.03	0.819	0.666	0.551	0.464	0.396	0.342
25x25	2.0	1.43	1	47.7	24.3	12.3	7.20	4.70	3.30	2.45	1.88	1.50	1.22	1.01	0.849	0.725	0.626
	2.5	1.74	1	58.1	28.7	14.4	8.39	5.47	3.85	2.85	2.19	1.74	1.42	1.17	0.989	0.844	0.729
	3.0	2.04	1	68.0	32.3	16.1	9.37	6.11	4.29	3.18	2.45	1.94	1.58	1.31	1.10	0.941	0.813
	3.2	2.15	1	71.8	33.6	16.7	9.71	6.33	4.45	3.29	2.53	2.01	1.64	1.36	1.14	0.975	0.842
30x30	2.5	2.14	1	71.2	45.9	25.2	15.0	9.87	6.97	5.17	3.99	3.17	2.58	2.14	1.80	1.54	1.33
	3.0	2.51	1	83.7	52.8	28.6	17.0	11.2	7.88	5.85	4.51	3.59	2.92	2.42	2.04	1.74	1.51
	3.2	2.65	1	88.5	55.3	29.9	17.7	11.6	8.21	6.09	4.70	3.73	3.04	2.52	2.12	1.81	1.57
40x40	2.5	2.92	1	97.4	80.0	56.0	35.9	24.2	17.2	12.9	9.97	7.95	6.48	5.38	4.54	3.88	3.36
	3.0	3.45	1	115	93.8	64.9	41.4	27.8	19.8	14.8	11.5	9.14	7.45	6.19	5.22	4.46	3.86
	3.2	3.66	1	122	99.2	68.3	43.5	29.2	20.8	15.5	12.0	9.58	7.81	6.49	5.47	4.68	4.05
	4.0	4.46	1	149	119	80.6	50.9	34.1	24.3	18.1	14.0	11.2	9.10	7.56	6.37	5.45	4.71
	5.0	5.40	1	180	142	93.4	58.5	39.0	27.7	20.7	16.0	12.7	10.4	8.62	7.27	6.22	5.38
50x50	2.5	3.71	1	124	110	91.3	66.3	46.7	33.9	25.5	19.9	15.9	13.0	10.8	9.14	7.83	6.78
	3.0	4.39	1	147	130	107	77.3	54.3	39.4	29.7	23.1	18.5	15.1	12.6	10.6	9.08	7.86
	3.2	4.66	1	156	138	113	81.6	57.2	41.5	31.2	24.3	19.4	15.9	13.2	11.2	9.56	8.27
	4.0	5.72	1	191	169	137	97.4	68.0	49.2	37.0	28.8	23.0	18.8	15.6	13.2	11.3	9.79
	5.0	6.97	1	233	204	164	115	79.6	57.4	43.2	33.6	26.8	21.9	18.2	15.4	13.2	11.4
	6.3	8.49	1	283	246	193	133	91.8	66.1	49.6	38.5	30.8	25.1	20.9	17.6	15.1	13.1
60x60	3.0	5.34	1	178	165	147	119	89.9	67.2	51.3	40.3	32.3	26.5	22.1	18.7	16.0	13.9
	3.2	5.67	1	189	175	156	126	95.0	70.9	54.2	42.5	34.1	28.0	23.3	19.7	16.9	14.7
	4.0	6.97	1	233	215	190	153	114	85.1	64.9	50.8	40.8	33.4	27.9	23.6	20.2	17.5
	5.0	8.54	1	285	262	231	184	136	101	76.8	60.1	48.2	39.5	32.9	27.9	23.9	20.7
	6.3	10.5	1	349	320	279	219	160	118	89.9	70.3	56.3	46.1	38.4	32.5	27.9	24.1
	8.0	12.8	1	428	389	335	257	186	136	103	80.6	64.6	52.9	44.0	37.2	31.9	27.6
70x70	3.0	6.28	1	209	198	184	161	131	103	80.1	63.5	51.4	42.3	35.4	30.0	25.8	22.4
	3.6	7.46	1	249	235	218	190	154	120	93.7	74.2	60.0	49.4	41.3	35.0	30.1	26.1
	5.0	10.1	1	337	318	293	254	204	157	122	96.7	78.0	64.2	53.7	45.5	39.0	33.9
	6.3	12.5	1	415	391	358	308	244	187	145	115	92.4	75.9	63.4	53.8	46.1	40.0
	8.0	15.3	1	512	479	437	370	289	220	170	134	108	88.5	73.9	62.6	53.7	46.6
80x80	3.0	7.22	1	241	232	219	200	174	143	115	93.1	75.9	62.9	52.8	44.9	38.6	33.6
	3.6	8.59	1	286	275	260	237	206	169	136	109	89.0	73.7	61.8	52.6	45.2	39.3
	5.0	11.7	1	390	374	352	320	275	224	179	144	117	96.7	81.1	69.0	59.3	51.5
	6.3	14.4	1	481	461	433	391	334	270	215	172	140	115	96.8	82.3	70.7	61.4
	8.0	17.8	1	595	568	532	478	402	322	255	204	165	136	114	97.1	83.4	72.4
90x90	3.6	9.72	1	324	315	301	281	255	220	183	151	125	104	87.7	74.8	64.5	56.2
	5.0	13.3	1	442	429	409	382	343	295	244	200	165	138	116	98.9	85.2	74.1
	6.3	16.4	1	547	530	505	470	421	359	296	242	199	165	139	119	102	89.0
	8.0	20.4	1	679	656	624	578	514	434	356	290	238	197	166	142	122	106

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION

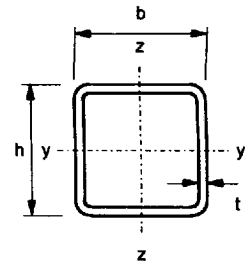


DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm.mm	mm	kg/m		kN	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
100x100	4.0	12.0	1	400	358	298	218	154	112	84.4	65.8	52.6	43.0	35.8	30.2	25.9	22.4
	5.0	14.8	1	494	441	365	265	187	136	102	79.6	63.6	52.0	43.3	36.6	31.3	27.1
	6.3	18.4	1	613	545	448	322	226	164	123	96.0	76.8	62.7	52.2	44.1	37.8	32.7
	8.0	22.9	1	763	674	548	389	272	197	148	115	92.0	75.2	62.5	52.8	45.2	39.1
	10.0	27.9	1	930	817	654	458	318	230	173	134	107	87.6	72.9	61.6	52.7	45.6
120x120	4.0	14.5	1	484	449	403	331	251	188	144	113	91.0	74.6	62.3	52.7	45.2	39.2
	5.0	18.0	1	599	555	497	406	307	230	176	138	111	90.8	75.8	64.1	55.0	47.6
	6.3	22.3	1	745	690	615	499	375	280	214	168	135	110	92.1	78.0	66.8	57.9
	8.0	27.9	1	931	859	762	612	457	340	260	203	163	134	112	94.4	80.9	70.1
	10.0	34.2	1	1140	1050	924	734	544	403	307	240	193	158	132	111	95.5	82.7
	12.5	41.6	1	1390	1270	1110	870	638	471	358	280	224	184	153	129	111	96.1
140x140	5.0 †	21.1	1	704	667	619	545	446	349	273	217	175	144	121	102	87.9	76.3
	6.3 †	26.3	1	877	831	769	674	549	428	334	265	214	176	148	125	107	93.2
	8.0 †	32.9	1	1100	1040	959	836	676	525	409	324	262	215	180	153	131	114
	10.0 †	40.4	1	1350	1270	1170	1020	814	630	489	387	312	257	215	182	156	135
	12.5 †	49.5	1	1650	1550	1420	1220	970	745	577	456	367	302	252	214	184	159
150x150	5.0	22.7	1	756	723	678	611	517	416	330	264	214	177	148	126	108	94.0
	6.3	28.3	1	943	901	843	758	639	512	405	324	263	217	182	154	133	115
	8.0	35.4	1	1180	1130	1050	943	790	630	497	397	322	266	222	189	162	141
	10.0	43.6	1	1450	1380	1290	1150	957	759	597	476	385	318	266	226	194	168
	12.5	53.4	1	1780	1690	1570	1390	1150	904	708	563	456	376	314	267	229	199
	16.0	66.4	1	2210	2100	1940	1700	1380	1080	841	667	539	444	371	315	270	234
160x160	5.0 †	24.2	1	809	778	735	674	588	486	392	316	258	214	179	153	131	114
	6.0 †	28.9	1	963	926	875	801	696	574	462	372	304	251	211	180	154	134
	6.3 †	30.3	1	1010	970	916	838	728	599	482	389	317	262	220	187	161	140
	8.0 †	37.9	1	1270	1220	1150	1050	904	741	594	478	389	322	270	230	198	172
	10.0 †	46.7	1	1560	1490	1410	1280	1100	895	716	575	468	387	325	276	237	206
	12.5 †	57.3	1	1910	1830	1720	1560	1330	1070	853	684	556	459	385	327	281	244
180x180	5.0 †	27.4	2	914	888	849	796	723	628	526	434	359	300	253	216	186	162
	6.3	34.2	1	1140	1110	1060	993	899	779	651	536	443	370	312	266	229	200
	8.0	43.0	1	1430	1390	1330	1240	1120	968	806	663	547	456	384	328	283	246
	10.0	53.0	1	1770	1710	1630	1530	1370	1180	977	802	661	550	464	395	341	297
	12.5	65.2	1	2170	2110	2000	1870	1670	1430	1180	961	791	658	554	472	407	354
	16.0	81.4	1	2720	2630	2490	2310	2060	1740	1420	1160	951	790	665	566	488	424
200x200	5.0 †	30.5	3	1020	998	961	914	851	768	668	567	477	402	342	293	254	221
	6.3	38.2	1	1270	1250	1200	1140	1060	955	829	702	590	497	422	362	313	273
	8.0	48.0	1	1600	1570	1510	1430	1330	1190	1030	872	731	616	523	448	387	338
	10.0	59.3	1	1980	1930	1860	1760	1630	1460	1260	1060	888	747	633	542	469	409
	12.5	73.0	1	2440	2380	2290	2160	2000	1780	1530	1280	1070	898	761	651	563	490
	16.0	91.5	1	3050	2980	2860	2700	2480	2190	1870	1560	1300	1090	920	787	679	592
250x250	6.3	48.1	3	1600	1590	1550	1500	1440	1360	1270	1150	1020	892	777	677	593	521
	8.0	60.5	1	2020	2010	1950	1890	1810	1710	1590	1440	1270	1110	968	843	738	649
	10.0	75.0	1	2500	2480	2410	2330	2240	2110	1960	1770	1560	1360	1180	1030	900	791
	12.5	92.6	1	3090	3060	2980	2880	2760	2600	2400	2160	1900	1660	1440	1250	1090	958
	16.0	117	1	3890	3850	3740	3610	3460	3250	2990	2680	2350	2040	1770	1530	1340	1170

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.



COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION

DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm.mm	mm	kg/m		kN	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
300x300	6.3 †	57.9	4	1700	**1700**	1670	1630	1590	1550	1490	1420	1340	1240	1140	1030	931	836
	8.0	73.1	2	2440	**2440**	2390	2330	2270	2190	2090	1980	1840	1680	1510	1350	1210	1080
	10.0	90.7	1	3030	**3030**	2960	2890	2810	2710	2590	2440	2270	2070	1860	1660	1480	1320
	12.5	112	1	3750	**3750**	3670	3570	3470	3350	3200	3010	2790	2540	2280	2030	1810	1610
	16.0	142	1	4730	**4730**	4620	4510	4370	4210	4010	3770	3480	3160	2830	2520	2240	1990
350x350	8.0	85.7	4	2650	**2650**	2630	2580	2530	2470	2400	2320	2230	2120	1990	1850	1700	1560
	10.0	106	2	3550	**3550**	3510	3440	3370	3280	3180	3070	2930	2760	2570	2370	2160	1970
	12.5	132	1	4400	**4400**	4350	4260	4170	4060	3940	3790	3610	3400	3170	2910	2660	2410
	16.0	167	1	5570	**5570**	5500	5390	5270	5130	4970	4780	4550	4280	3970	3640	3320	3000
400x400	10.0	122	3	4070	**4070**	4060	3990	3920	3840	3760	3660	3540	3410	3250	3070	2880	2670
	12.5	152	1	5050	**5050**	5030	4950	4860	4760	4660	4530	4380	4210	4020	3790	3550	3290
	16.0	192	1	6400	**6400**	6370	6270	6150	6030	5890	5730	5540	5320	5060	4770	4460	4130
	20.0	237	1	7910	**7910**	7870	7740	7590	7440	7260	7060	6820	6540	6210	5840	5450	5040

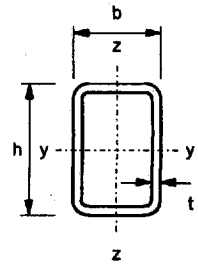
† Sections marked thus are not included in BS4848: Part 2.

Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



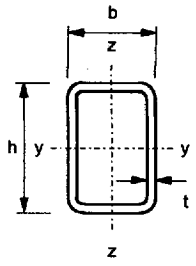
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size	Thick-ness	Metre		Resist.	Axis	Buckling length in metres												
h x b	t			$N_{c.Rd}$														
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
50x25	2.5	2.72	1	90.9	y	78.7	61.3	41.9	28.8	20.7	15.5	12.1	9.64	7.87	6.54	5.52	4.73	4.09
					z	50.7	26.2	15.4	10.1	7.11	5.27	4.06	3.22	2.62	2.17	1.83	1.56	1.35
	3.0	3.22	1	107	y	92.5	71.3	48.4	33.2	23.9	17.9	13.9	11.1	9.05	7.52	6.35	5.44	4.70
					z	58.1	29.8	17.5	11.4	8.05	5.96	4.60	3.65	2.97	2.46	2.07	1.77	1.53
	3.2	3.41	1	114	y	97.9	75.1	50.9	34.8	25.0	18.8	14.6	11.6	9.49	7.89	6.66	5.70	4.93
					z	60.8	31.1	18.2	11.9	8.38	6.21	4.79	3.80	3.09	2.56	2.16	1.84	1.59
50x30	2.5	2.92	1	97.4	y	85.1	67.5	46.9	32.4	23.4	17.6	13.6	10.9	8.90	7.40	6.25	5.35	4.63
					z	67.2	38.5	23.2	15.3	10.8	8.02	6.19	4.92	4.01	3.32	2.80	2.39	2.07
	3.0	3.45	1	115	y	100	78.8	54.3	37.5	27.0	20.3	15.7	12.6	10.3	8.53	7.21	6.17	5.34
					z	78.0	44.2	26.5	17.5	12.3	9.16	7.07	5.62	4.57	3.79	3.20	2.73	2.36
	3.2	3.66	1	122	y	106	83.1	57.1	39.4	28.3	21.3	16.5	13.2	10.8	8.95	7.56	6.47	5.60
					z	82.1	46.2	27.7	18.3	12.9	9.57	7.39	5.87	4.78	3.96	3.34	2.85	2.47
	4.0	4.46	1	149	y	128	99.2	67.4	46.2	33.2	24.9	19.3	15.4	12.6	10.5	8.85	7.57	6.55
					z	97.0	53.6	32.0	21.0	14.8	11.0	8.50	6.76	5.50	4.56	3.84	3.28	2.84
	5.0	5.40	1	180	y	154	117	78.1	53.3	38.2	28.6	22.2	17.7	14.5	12.0	10.2	8.69	7.52
					z	112	60.7	36.1	23.7	16.7	12.4	9.55	7.59	6.17	5.12	4.32	3.69	3.19
60x40	2.5	3.71	1	124	y	113	99.7	78.8	58.1	43.0	32.7	25.6	20.5	16.8	14.0	11.9	10.2	8.81
					z	104	75.8	49.7	33.7	24.1	18.0	14.0	11.1	9.08	7.55	6.37	5.45	4.71
	3.0	4.39	1	147	y	134	118	92.3	67.8	50.1	38.1	29.8	23.9	19.6	16.3	13.8	11.8	10.2
					z	122	88.4	57.6	39.0	27.9	20.8	16.1	12.9	10.5	8.72	7.36	6.30	5.45
	3.2	4.66	1	156	y	142	125	97.6	71.5	52.8	40.1	31.4	25.2	20.6	17.2	14.5	12.4	10.8
					z	130	93.2	60.6	41.0	29.3	21.9	17.0	13.5	11.0	9.16	7.73	6.61	5.72
	4.0	5.72	1	191	y	174	151	117	85.4	62.9	47.7	37.3	29.9	24.5	20.4	17.3	14.8	12.8
					z	157	111	71.6	48.3	34.5	25.7	19.9	15.9	13.0	10.8	9.08	7.77	6.72
	5.0	6.97	1	233	y	211	182	139	101	73.9	56.0	43.7	35.0	28.7	23.9	20.2	17.3	15.0
					z	189	131	83.3	55.9	39.9	29.8	23.0	18.4	15.0	12.4	10.5	8.97	7.76
	6.3	8.49	1	283	y	256	218	163	117	85.6	64.7	50.5	40.4	33.0	27.5	23.3	19.9	17.3
					z	226	151	95.1	63.6	45.3	33.8	26.1	20.8	17.0	14.1	11.9	10.2	8.78
80x40	3.0	5.34	1	178	y	169	158	141	117	92.7	72.9	58.1	47.1	38.8	32.5	27.6	23.7	20.6
					z	151	111	73.7	50.1	35.9	26.8	20.8	16.6	13.5	11.3	9.50	8.13	7.03
	3.2	5.67	1	189	y	180	168	149	124	98.0	77.1	61.4	49.7	41.0	34.3	29.1	25.0	21.7
					z	160	118	77.6	52.7	37.7	28.2	21.9	17.5	14.2	11.8	9.99	8.55	7.39
	4.0	6.97	1	233	y	221	205	182	150	118	92.8	73.7	59.7	49.2	41.2	34.9	30.0	26.0
					z	195	141	92.2	62.4	44.6	33.4	25.9	20.6	16.8	14.0	11.8	10.1	8.72
	5.0	8.54	1	285	y	270	250	220	180	141	110	87.7	70.9	58.4	48.8	41.4	35.6	30.9
					z	236	167	108	72.8	51.9	38.8	30.1	24.0	19.5	16.2	13.7	11.7	10.1
	6.3	10.5	1	349	y	330	305	266	215	167	130	103	83.4	68.6	57.4	48.7	41.8	36.2
					z	284	195	124	83.5	59.5	44.4	34.4	27.4	22.3	18.6	15.7	13.4	11.6
	8.0	12.8	1	428	y	403	370	318	254	195	151	119	96.4	79.2	66.2	56.1	48.2	41.8
					z	338	223	140	93.5	66.4	49.5	38.3	30.5	24.9	20.6	17.4	14.9	12.9

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



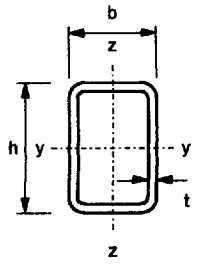
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		1.0	1.5.	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
90x50	3.0	6.28	1	209	y	202	192	177	156	131	107	86.5	70.8	58.8	49.4	42.1	36.2	31.5
					z	189	162	122	87.4	63.9	48.4	37.7	30.2	24.7	20.6	17.4	14.9	12.9
	3.6	7.46	1	249	y	240	227	210	184	154	125	101	82.9	68.8	57.8	49.2	42.4	36.8
					z	224	190	142	102	74.3	56.1	43.8	35.0	28.7	23.9	20.2	17.3	15.0
	5.0	10.1	1	337	y	325	307	282	246	204	165	133	109	90.0	75.6	64.3	55.3	48.1
					z	302	253	185	131	95.5	72.0	56.1	44.9	36.7	30.6	25.8	22.1	19.1
	6.3	12.5	1	415	y	399	377	344	298	245	197	159	129	107	89.8	76.4	65.7	57.1
					z	369	304	219	154	112	84.2	65.5	52.4	42.8	35.6	30.1	25.8	22.3
	8.0	15.3	1	512	y	490	461	419	359	292	233	187	152	126	105	89.6	77.0	66.9
					z	450	363	255	178	128	96.5	75.0	59.9	49.0	40.7	34.4	29.4	25.5
100x50	3.0	6.75	1	225	y	219	209	197	179	156	131	108	89.5	74.7	63.1	53.9	46.5	40.5
					z	204	175	133	95.6	70.0	53.0	41.4	33.1	27.1	22.6	19.1	16.4	14.2
	3.2	7.18	1	239	y	233	223	209	190	165	139	114	94.7	79.1	66.8	57.0	49.2	42.8
					z	217	186	140	101	73.9	56.0	43.7	35.0	28.6	23.8	20.1	17.3	14.9
	4.0	8.86	1	296	y	287	274	257	233	202	169	139	115	95.9	80.9	69.0	59.5	51.8
					z	267	226	170	121	88.6	67.0	52.2	41.8	34.2	28.5	24.1	20.6	17.9
	5.0	10.9	1	364	y	353	337	315	284	245	204	168	138	115	97.2	82.9	71.5	62.2
					z	326	274	203	144	105	79.2	61.8	49.4	40.4	33.6	28.4	24.3	21.1
	6.3	13.4	1	448	y	435	414	386	347	297	245	201	165	138	116	99.0	85.3	74.2
					z	400	331	241	169	123	92.8	72.2	57.8	47.2	39.3	33.2	28.4	24.6
	8.0	16.6	1	553	y	535	509	473	421	357	293	239	196	163	137	117	101	87.5
					z	489	396	281	196	142	107	83.0	66.3	54.2	45.1	38.1	32.6	28.2
100x60	3.0	7.22	1	241	y	235	225	212	194	171	145	120	99.9	83.7	70.7	60.5	52.2	45.5
					z	225	204	172	133	101	77.6	61.1	49.2	40.4	33.7	28.5	24.5	21.2
	3.6	8.59	1	286	y	279	267	252	230	202	170	142	117	98.3	83.0	71.0	61.2	53.3
					z	267	242	202	156	118	90.6	71.3	57.3	47.1	39.3	33.3	28.5	24.7
	5.0	11.7	1	390	y	379	363	341	310	270	227	187	155	130	109	93.5	80.6	70.2
					z	362	326	269	205	154	118	92.7	74.5	61.1	51.0	43.2	37.0	32.1
	6.3	14.4	1	481	y	468	447	419	379	328	274	226	187	156	131	112	96.6	84.1
					z	446	398	324	245	183	140	110	88.1	72.2	60.2	51.0	43.7	37.9
	8.0	17.8	1	595	y	577	550	514	462	397	329	270	222	185	156	133	115	99.7
					z	548	485	388	289	214	163	128	103	84.1	70.2	59.4	50.9	44.1
120x60	3.6	9.72	1	324	y	319	309	296	280	258	230	200	171	146	125	108	93.4	81.7
					z	303	276	233	181	138	106	83.5	67.2	55.2	46.1	39.0	33.5	29.0
	5.0	13.3	1	442	y	435	420	402	379	348	310	268	228	194	166	143	124	108
					z	412	373	310	239	180	138	109	87.6	71.9	60.0	50.8	43.6	37.8
	6.3	16.4	1	547	y	538	520	497	467	427	378	326	277	235	201	172	150	131
					z	509	457	376	286	215	165	129	104	85.2	71.1	60.2	51.6	44.7
	8.0	20.4	1	679	y	667	643	614	575	524	460	394	334	283	241	207	179	156
					z	628	559	452	339	253	193	152	122	99.7	83.2	70.4	60.4	52.3

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



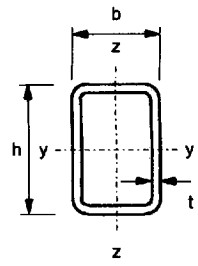
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size	Thick-ness	Metre		Resist.	Axis	Buckling length in metres												
h x b	t			$N_{c.Rd}$														
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
120x80	5.0	14.8	1	494	y	488	472	454	430	399	360	315	271	232	199	172	150	131
					z	476	451	415	364	303	246	199	163	135	113	96.3	82.9	72.1
	6.3	18.4	1	613	y	605	585	562	531	491	441	385	331	282	242	209	181	159
					z	590	558	511	445	368	297	240	196	162	136	116	99.6	86.5
	8.0	22.9	1	763	y	751	726	696	657	605	540	469	401	342	292	252	218	191
					z	732	690	629	543	445	356	287	233	193	162	138	119	103
	10.0	27.9	1	930	y	915	884	845	795	728	646	557	474	403	344	296	256	224
					z	890	836	757	645	522	416	333	271	224	188	159	137	119
150x100	5.0	18.7	1	625	y	**625**	610	594	575	552	524	489	448	403	359	317	281	249
					z	614	592	564	528	479	420	359	304	257	219	188	163	142
	6.3	23.3	1	778	y	777	759	738	714	685	649	604	552	496	440	389	344	304
					z	763	735	700	654	591	516	439	370	313	266	228	197	172
	8.0	29.1	1	972	y	970	947	921	890	853	806	748	681	610	540	476	420	372
					z	952	917	871	810	729	632	535	450	379	322	276	239	208
	10.0	35.7	1	1190	y	**1190**	1160	1130	1090	1040	980	907	822	733	647	569	501	443
					z	1170	1120	1060	983	878	756	636	533	448	380	325	281	245
	12.5	43.6	1	1450	y	**1450**	1410	1370	1320	1260	1180	1090	981	870	765	671	590	521
					z	1420	1360	1290	1180	1050	892	745	621	520	441	377	325	284
160x80	5.0	18.0	1	599	y	**599**	586	571	553	533	507	476	438	397	355	316	280	249
					z	579	550	509	452	381	311	253	208	173	145	124	106	92.6
	6.3	22.3	1	745	y	**745**	728	709	687	661	628	588	541	489	436	387	343	304
					z	719	682	629	555	465	378	307	251	208	175	149	128	112
	8.0	27.9	1	931	y	929	908	884	856	822	780	728	667	601	535	473	419	371
					z	896	847	779	681	565	456	369	301	250	210	178	154	133
	10.0	34.2	1	1140	y	**1140**	1110	1080	1050	1000	948	882	804	722	640	565	499	442
					z	1090	1030	942	815	668	536	432	352	291	244	208	179	155
	12.5	41.6	1	1390	y	1380	1350	1310	1270	1210	1140	1060	960	856	756	666	586	518
					z	1330	1250	1130	961	777	618	495	403	333	279	237	204	177
200x100	5.0	22.7	3	756	y	**756**	750	736	721	704	685	662	635	603	567	526	484	443
					z	744	718	687	646	592	524	452	384	326	279	240	208	182
	6.3	28.3	1	943	y	**943**	935	917	898	877	853	824	789	749	702	651	599	546
					z	927	895	855	802	732	645	554	470	399	340	292	253	221
	8.0	35.4	1	1180	y	**1180**	1170	1150	1120	1100	1070	1030	984	932	873	808	740	675
					z	1160	1120	1070	998	906	794	679	573	485	413	354	307	268
	10.0	43.6	1	1450	y	**1450**	1440	1410	1380	1350	1310	1260	1200	1140	1060	980	897	815
					z	1420	1370	1310	1220	1100	956	811	683	576	490	420	363	317
	12.5	53.4	1	1780	y	**1780**	1760	1730	1690	1640	1590	1530	1460	1380	1280	1180	1080	976
					z	1740	1670	1590	1470	1320	1140	957	802	674	572	490	423	369
	16.0	66.4	1	2210	y	**2210**	2190	2140	2090	2040	1970	1890	1800	1680	1560	1430	1300	1170
					z	2160	2070	1950	1800	1590	1350	1120	936	784	664	567	490	427

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



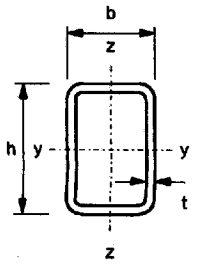
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size	Thick-ness	Metre		Resist.	Axis	Buckling length in metres												
h x b	t			$N_{c.Rd}$														
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
200x120	5.0 †	24.2	3	809	y	**809**	803	789	773	756	736	713	686	654	617	576	533	489
					z	803	782	757	726	688	639	580	516	452	394	343	301	264
	6.0 †	28.9	1	963	y	**963**	956	939	920	900	876	848	815	777	732	683	631	578
					z	956	930	900	864	817	758	686	608	532	463	403	353	310
	6.3 †	30.3	1	1010	y	**1010**	1000	984	964	942	917	888	854	813	766	714	660	605
					z	1000	974	943	904	855	793	717	636	555	483	421	368	324
	8.0 †	37.9	1	1270	y	**1270**	1260	1230	1210	1180	1150	1110	1070	1010	954	887	818	748
					z	1260	1220	1180	1130	1070	985	888	783	682	592	515	450	395
	10.0 †	46.7	1	1560	y	**1560**	1540	1520	1490	1450	1410	1360	1310	1240	1160	1080	993	907
					z	1540	1500	1450	1390	1300	1200	1080	944	820	710	616	538	472
	12.5 †	57.3	1	1910	y	**1910**	1890	1860	1820	1770	1720	1660	1590	1510	1410	1300	1200	1090
					z	1890	1840	1770	1690	1580	1450	1290	1130	973	840	727	634	556
200x150	5.0 †	26.6	3	887	y	**887**	882	867	851	833	813	789	761	729	692	649	604	557
					z	**887**	871	851	828	801	769	729	682	628	570	512	458	410
	6.3 †	33.2	1	1110	y	**1110**	1100	1080	1060	1040	1010	984	949	907	860	806	749	690
					z	**1110**	1090	1060	1030	999	958	907	847	777	704	632	565	504
	8.0 †	41.7	1	1390	y	**1390**	1380	1360	1330	1300	1270	1230	1190	1130	1070	1000	931	856
					z	**1390**	1360	1330	1290	1250	1200	1130	1050	965	872	781	697	621
	10.0 †	51.4	1	1720	y	**1720**	1700	1670	1640	1600	1560	1510	1460	1390	1310	1230	1130	1040
					z	**1720**	1680	1640	1590	1540	1470	1390	1290	1170	1060	944	841	749
	12.5 †	63.2	1	2110	y	**2110**	2090	2050	2010	1970	1910	1850	1780	1690	1590	1490	1370	1260
					z	**2110**	2060	2010	1950	1880	1790	1690	1560	1420	1270	1130	1010	894
	16.0 †	78.9	1	2630	y	**2630**	2610	2560	2510	2450	2380	2300	2200	2090	1960	1820	1670	1520
					z	**2630**	2570	2500	2430	2330	2220	2070	1900	1720	1530	1360	1210	1070
250x100	6.3 †	33.2	3	1110	y	**1110**	**1110**	1090	1080	1060	1040	1020	990	961	927	888	845	798
					z	1090	1050	1010	949	871	773	668	569	484	413	356	308	270
	8.0 †	41.7	1	1390	y	**1390**	**1390**	1370	1350	1330	1300	1270	1240	1200	1160	1110	1050	994
					z	1370	1320	1260	1180	1080	955	821	697	591	504	433	375	328
	10.0 †	51.4	1	1720	y	**1720**	**1720**	1690	1660	1630	1600	1570	1520	1480	1420	1360	1290	1210
					z	1680	1620	1550	1450	1310	1150	985	832	704	599	514	445	389
	12.5 †	63.2	1	2110	y	**2110**	**2110**	2070	2040	2000	1960	1920	1870	1810	1740	1660	1570	1470
					z	2070	1990	1890	1760	1590	1380	1170	981	828	703	603	521	455
	16.0 †	78.9	1	2630	y	**2630**	**2630**	2590	2540	2500	2440	2380	2320	2240	2150	2040	1930	1800
					z	2570	2470	2340	2160	1920	1650	1380	1150	969	821	702	607	529

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
† Sections marked thus are not included in BS4848: Part 2.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
250x150	5.0 †	30.5	4	921	y	914	889	860	824	779	721	652	576	503	437	381	333	293
					z	890	845	782	693	583	476	387	318	264	222	189	163	141
	6.3	38.2	3	1270	y	1260	1220	1180	1120	1050	959	853	743	641	553	479	417	366
					z	1220	1150	1050	914	751	603	485	396	328	275	234	201	175
	8.0	48.0	1	1600	y	1580	1540	1480	1410	1320	1200	1060	924	797	686	594	517	453
					z	1540	1450	1320	1140	930	744	599	488	403	338	288	247	215
	10.0	59.3	1	1980	y	1950	1890	1820	1730	1620	1470	1300	1130	970	835	722	628	550
					z	1900	1780	1620	1390	1130	900	722	588	486	407	346	298	259
	12.5	73.0	1	2440	y	2410	2330	2240	2130	1980	1790	1580	1360	1170	1010	870	756	662
					z	2330	2190	1980	1680	1360	1080	863	701	579	486	413	355	308
	16.0	91.5	1	3050	y	3010	2910	2800	2650	2460	2210	1940	1670	1430	1220	1060	918	804
					z	2910	2720	2440	2050	1640	1300	1030	840	693	580	493	424	368
260x140	6.3 †	38.2	3	1270	y	1260	1230	1180	1130	1060	977	875	767	665	576	500	436	383
					z	1220	1140	1020	863	692	548	438	355	293	246	209	179	156
	8.0 †	48.0	1	1600	y	1590	1540	1490	1420	1330	1220	1090	955	827	715	620	540	474
					z	1530	1430	1280	1070	855	675	538	437	360	302	256	220	191
	10.0 †	59.3	1	1980	y	1960	1900	1830	1750	1640	1500	1330	1160	1010	869	753	656	576
					z	1880	1760	1560	1300	1030	814	648	525	433	363	308	264	230
	12.5 †	73.0	1	2440	y	2410	2340	2250	2140	2010	1830	1620	1410	1220	1050	908	791	693
					z	2310	2150	1910	1570	1240	971	772	625	515	431	366	314	273
	16.0 †	91.5	1	3050	y	3020	2920	2810	2670	2490	2260	1990	1730	1490	1280	1100	961	842
					z	2890	2680	2350	1910	1490	1160	922	746	614	513	436	374	324
300x100	6.3 †	38.2	4	1150	y	**1150**	1120	1090	1060	1010	953	883	802	717	633	558	492	435
					z	1060	940	750	557	414	315	247	198	162	135	115	98.1	85.0
	8.0 †	48.0	2	1600	y	1590	1550	1500	1450	1370	1280	1170	1050	925	809	708	621	547
					z	1460	1260	962	696	511	387	303	242	198	165	140	120	104
	10.0 †	59.3	1	1980	y	1970	1910	1850	1780	1690	1580	1440	1280	1130	985	861	754	664
					z	1790	1530	1160	832	609	461	360	288	235	196	166	142	123
	12.5 †	73.0	1	2440	y	2420	2350	2280	2190	2070	1930	1750	1560	1370	1190	1040	909	800
					z	2190	1850	1380	980	715	540	421	337	276	230	194	166	144
	16.0 †	91.5	1	3050	y	3030	2950	2850	2730	2580	2390	2160	1910	1670	1450	1260	1110	972
					z	2720	2250	1640	1150	837	631	491	393	321	267	226	193	167
300x200	6.3	48.1	4	1480	y	**1480**	1450	1420	1380	1330	1270	1200	1110	1010	911	813	724	644
					z	1460	1410	1360	1280	1180	1050	917	785	669	573	493	428	374
	8.0	60.5	2	2020	y	**2020**	1970	1920	1860	1790	1700	1590	1460	1310	1170	1040	918	814
					z	1980	1910	1830	1710	1560	1370	1180	996	844	719	618	535	467
	10.0	75.0	1	2500	y	**2500**	2440	2380	2300	2210	2100	1960	1790	1610	1430	1270	1120	996
					z	2460	2370	2260	2110	1920	1680	1440	1210	1030	875	751	650	568
	12.5	92.6	1	3090	y	3080	3010	2930	2840	2720	2580	2400	2190	1970	1750	1550	1370	1210
					z	3030	2920	2780	2600	2350	2050	1740	1470	1240	1060	906	784	684
	16.0	117	1	3890	y	3880	3790	3680	3560	3410	3220	2990	2720	2440	2160	1900	1680	1490
					z	3810	3670	3480	3240	2910	2530	2140	1800	1520	1290	1100	954	832

y - y is the major axis and z - z is the minor axis.
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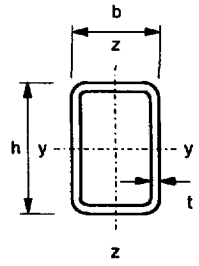
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



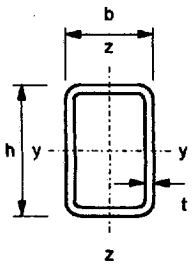
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
300x250	6.3 †	53.0	4	1650	y	**1650**	1620	1580	1540	1490	1420	1350	1260	1150	1040	937	837	747
					z	1640	1600	1560	1500	1430	1340	1240	1120	990	871	764	672	593
	8.0 †	66.8	2	2230	y	**2230**	2180	2130	2060	1990	1900	1780	1650	1500	1340	1200	1060	946
					z	2220	2160	2090	2010	1910	1780	1620	1440	1270	1110	967	847	746
	10.0 †	82.8	1	2760	y	**2760**	2700	2630	2550	2460	2340	2200	2030	1840	1650	1470	1300	1160
					z	2750	2670	2590	2480	2360	2190	1990	1770	1550	1350	1180	1030	911
	12.5 †	102	1	3420	y	**3420**	3340	3250	3150	3040	2890	2710	2490	2260	2020	1790	1590	1410
					z	3390	3300	3190	3070	2900	2690	2440	2160	1890	1650	1440	1260	1110
	16.0 †	129	1	4310	y	4300	4210	4100	3970	3810	3620	3390	3110	2800	2500	2220	1960	1740
					z	4270	4160	4020	3850	3640	3360	3030	2680	2340	2030	1770	1540	1360
350x150	6.3 †	48.1	4	1360	y	**1360**	1350	1320	1290	1250	1220	1170	1110	1040	968	888	807	731
					z	1320	1260	1180	1060	917	762	626	517	430	363	310	267	232
	8.0 †	60.5	4	1920	y	**1920**	1880	1840	1800	1740	1680	1600	1510	1400	1280	1160	1050	939
					z	1850	1750	1620	1430	1200	975	791	648	538	452	385	331	288
	10.0 †	75.0	2	2500	y	**2500**	2460	2400	2340	2260	2170	2060	1930	1780	1610	1450	1300	1160
					z	2400	2270	2080	1810	1490	1200	967	789	653	548	466	401	349
	12.5 †	92.6	1	3090	y	**3090**	3030	2960	2880	2790	2670	2530	2370	2180	1970	1770	1590	1420
					z	2970	2800	2550	2200	1800	1440	1160	945	782	656	558	480	417
	16.0 †	117	1	3890	y	**3890**	3810	3720	3620	3500	3350	3170	2950	2700	2440	2190	1960	1740
					z	3720	3500	3170	2710	2190	1750	1400	1140	941	789	671	577	501
350x250	8.0 †	73.1	4	2330	y	**2330**	2310	2260	2210	2150	2080	2000	1910	1800	1670	1530	1390	1260
					z	2320	2270	2200	2120	2020	1900	1750	1580	1400	1230	1080	948	837
	10.0 †	90.7	2	3030	y	**3030**	2980	2920	2850	2780	2680	2570	2440	2280	2110	1920	1740	1570
					z	3010	2930	2840	2730	2600	2420	2210	1980	1740	1530	1330	1170	1030
	12.5 †	112	1	3750	y	**3750**	3690	3620	3530	3430	3310	3170	3000	2810	2590	2360	2130	1920
					z	3720	3620	3510	3370	3200	2980	2720	2420	2130	1860	1620	1420	1250
	16.0 †	142	1	4730	y	**4730**	4660	4560	4450	4320	4170	3990	3770	3510	3230	2930	2650	2380
					z	4700	4570	4420	4240	4020	3730	3390	3010	2630	2290	2000	1750	1540
400x150	6.3 †	53.0	4	1390	y	**1390**	**1390**	1370	1340	1310	1280	1250	1210	1160	1110	1050	980	910
					z	1360	1300	1230	1120	983	831	691	573	480	406	346	299	260
	8.0 †	66.8	4	1980	y	**1980**	1970	1930	1890	1850	1800	1750	1680	1600	1510	1410	1310	1200
					z	1920	1830	1700	1530	1300	1070	879	723	602	507	432	372	324
	10.0 †	82.8	3	2760	y	**2760**	2730	2680	2620	2560	2480	2390	2280	2150	2010	1850	1690	1530
					z	2660	2510	2310	2020	1670	1350	1090	889	737	619	527	453	394
	12.5 †	102	1	3420	y	**3420**	3380	3310	3240	3160	3060	2940	2810	2650	2460	2260	2070	1870
					z	3280	3100	2830	2460	2020	1620	1310	1070	883	742	631	542	471
	16.0 †	129	1	4310	y	**4310**	4260	4170	4080	3970	3850	3700	3520	3310	3070	2820	2560	2320
					z	4130	3890	3530	3030	2470	1970	1580	1290	1070	894	759	653	567

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
† Sections marked thus are not included in BS4848: Part 2.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



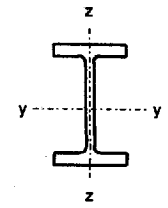
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
400x200	6.3 †	57.9	4	1560	y	**1560**	1550	1530	1500	1480	1440	1410	1360	1320	1260	1200	1120	1050
					z	1540	1500	1450	1380	1300	1200	1070	941	817	707	614	535	470
	8.0	73.1	4	2190	y	**2190**	2180	2140	2100	2060	2010	1950	1880	1800	1710	1610	1500	1380
					z	2160	2100	2010	1910	1780	1610	1410	1220	1050	898	776	674	591
	10.0	90.7	3	3030	y	**3030**	3000	2940	2880	2820	2740	2650	2540	2410	2270	2110	1940	1770
					z	2980	2870	2750	2580	2370	2100	1810	1540	1310	1110	958	831	726
	12.5	112	1	3750	y	**3750**	3710	3640	3570	3480	3380	3270	3130	2970	2790	2590	2380	2170
					z	3680	3550	3390	3180	2910	2560	2200	1870	1580	1350	1160	1000	878
	16.0	142	1	4730	y	**4730**	4680	4590	4500	4390	4260	4110	3940	3730	3490	3230	2960	2700
					z	4640	4470	4270	3990	3620	3180	2710	2290	1940	1650	1420	1230	1070
400x300	10.0 †	106	3	3550	y	**3550**	3530	3470	3400	3330	3250	3160	3050	2920	2770	2600	2420	2230
					z	**3550**	3480	3400	3310	3210	3080	2920	2730	2510	2280	2050	1830	1640
	12.5 †	132	1	4400	y	**4400**	4370	4300	4220	4130	4020	3910	3770	3600	3410	3200	2970	2740
					z	**4400**	4320	4220	4100	3970	3800	3600	3360	3090	2800	2510	2240	2000
	16.0 †	167	1	5570	y	**5570**	5530	5430	5330	5210	5080	4930	4750	4530	4290	4020	3720	3430
					z	**5570**	5460	5330	5180	5000	4790	4530	4220	3860	3490	3120	2790	2490
450x250	8.0 †	85.7	4	2450	y	**2450**	**2450**	2420	2380	2350	2300	2260	2200	2140	2070	1990	1900	1800
					z	**2450**	2390	2330	2260	2180	2070	1940	1790	1620	1440	1280	1140	1010
	10.0	106	4	3340	y	**3340**	**3340**	3290	3240	3180	3120	3050	2970	2870	2760	2640	2500	2350
					z	3330	3250	3160	3050	2920	2760	2550	2320	2070	1830	1610	1420	1260
	12.5	132	2	4400	y	**4400**	4390	4320	4250	4170	4080	3980	3860	3730	3570	3400	3200	2990
					z	4380	4270	4140	3990	3800	3560	3260	2930	2590	2280	1990	1750	1540
	16.0	167	1	5570	y	**5570**	5550	5460	5370	5270	5150	5020	4870	4700	4500	4270	4010	3740
					z	5540	5390	5230	5030	4780	4470	4080	3650	3220	2820	2460	2160	1900
500x200	8.0 †	85.7	4	2280	y	**2280**	**2280**	2270	2240	2200	2170	2130	2090	2050	2000	1940	1870	1800
					z	2260	2200	2130	2040	1920	1770	1600	1410	1220	1060	924	807	709
	10.0 †	106	4	3160	y	**3160**	**3160**	3130	3080	3040	2990	2930	2870	2790	2710	2620	2510	2400
					z	3120	3030	2910	2770	2580	2340	2070	1790	1540	1330	1150	998	875
	12.5 †	132	3	4400	y	**4400**	**4400**	4340	4270	4200	4120	4030	3930	3810	3680	3530	3360	3170
					z	4330	4180	4000	3770	3460	3070	2650	2260	1920	1640	1410	1230	1070
	16.0 †	167	1	5570	y	**5570**	**5570**	5480	5400	5310	5200	5090	4960	4810	4640	4440	4220	3970
					z	5470	5280	5050	4740	4320	3820	3280	2790	2360	2020	1730	1500	1310
500x300	10.0	122	4	3690	y	**3690**	**3690**	3660	3610	3560	3500	3440	3370	3300	3210	3120	3010	2880
					z	**3690**	3640	3560	3480	3380	3270	3130	2960	2770	2560	2330	2110	1910
	12.5	152	3	5050	y	**5050**	**5050**	5000	4930	4850	4770	4680	4570	4460	4320	4170	4000	3810
					z	**5050**	4970	4860	4730	4580	4400	4190	3930	3630	3310	2980	2670	2390
	16.0	192	1	6400	y	**6400**	**6400**	6330	6240	6140	6040	5920	5780	5630	5460	5260	5040	4800
					z	**6400**	6290	6140	5980	5790	5560	5280	4940	4550	4130	3720	3330	2980
	20.0 ∇	237	1	7910	y	**7910**	**7910**	7820	7700	7580	7450	7300	7130	6940	6720	6470	6190	5880
					z	**7910**	7760	7580	7370	7130	6840	6470	6040	5550	5030	4510	4030	3600

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
† Sections marked thus are not included in BS4848: Part 2.
∇ Sections marked thus are normally available in grade S 355 only.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

BENDING

UB SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
127x76x13	1.0	20.2	18.6	16.7	14.8	13.0	11.5	10.3	9.31	8.47	7.77	7.18	6.67	6.23	473
$M_{c.y.Rd}$ = 22.0	0.8	20.9	19.9	18.8	17.6	16.4	15.1	14.0	12.9	12.0	11.2	10.4	9.74	9.16	
$M_{c.z.Rd}$ = 5.91	0.6	**22.0**	20.8	20.2	19.6	19.0	18.4	17.8	17.1	16.4	15.7	15.1	14.5	13.8	
Class 1	0.4	**22.0**	**22.0**	**22.0**	**22.0**	20.7	20.5	20.2	20.0	19.7	19.5	19.2	18.9	18.7	
152x89x16	1.0	30.1	27.9	25.2	22.3	19.5	17.1	15.2	13.7	12.4	11.3	10.4	9.64	8.98	834
$M_{c.y.Rd}$ = 32.3	0.8	**32.3**	29.5	27.9	26.2	24.3	22.4	20.6	19.0	17.5	16.2	15.1	14.1	13.2	
$M_{c.z.Rd}$ = 8.17	0.6	**32.3**	**32.3**	29.9	29.0	28.0	27.1	26.1	25.0	24.0	23.0	22.0	21.0	20.1	
Class 1	0.4	**32.3**	**32.3**	**32.3**	**32.3**	30.4	30.0	29.6	29.2	28.9	28.5	28.1	27.6	27.2	
178x102x19	1.0	42.4	39.7	36.3	32.3	28.3	24.8	21.9	19.5	17.6	16.0	14.7	13.6	12.6	1356
$M_{c.y.Rd}$ = 44.9	0.8	**44.9**	41.6	39.6	37.2	34.7	32.0	29.4	27.0	24.8	22.9	21.3	19.8	18.5	
$M_{c.z.Rd}$ = 10.9	0.6	**44.9**	**44.9**	41.9	40.7	39.4	38.1	36.7	35.2	33.7	32.2	30.8	29.4	28.1	
Class 1	0.4	**44.9**	**44.9**	**44.9**	**44.9**	42.5	41.9	41.4	40.8	40.2	39.7	39.1	38.5	37.9	
203x102x23	1.0	58.0	54.3	49.7	44.3	38.9	34.1	30.1	26.9	24.2	22.1	20.2	18.7	17.4	2105
$M_{c.y.Rd}$ = 61.3	0.8	**61.3**	56.9	54.1	51.0	47.5	43.9	40.3	37.1	34.1	31.6	29.3	27.3	25.5	
$M_{c.z.Rd}$ = 13.0	0.6	**61.3**	**61.3**	57.3	55.7	53.9	52.1	50.2	48.2	46.2	44.2	42.3	40.4	38.6	
Class 1	0.4	**61.3**	**61.3**	**61.3**	**61.3**	58.1	57.3	56.6	55.8	55.0	54.3	53.5	52.7	51.9	
203x133x25	1.0	**67.5**	62.7	59.3	55.1	50.2	45.1	40.2	36.0	32.4	29.3	26.8	24.6	22.8	2340
$M_{c.y.Rd}$ = 67.5	0.8	**67.5**	**67.5**	62.3	59.8	57.0	53.8	50.4	47.0	43.7	40.5	37.7	35.1	32.9	
$M_{c.z.Rd}$ = 18.6	0.6	**67.5**	**67.5**	**67.5**	63.2	61.7	60.1	58.4	56.7	54.8	52.9	51.0	49.0	47.1	
Class 1	0.4	**67.5**	**67.5**	**67.5**	**67.5**	**67.5**	**67.5**	63.6	62.8	62.1	61.4	60.6	59.9	59.1	
203x133x30	1.0	**82.3**	76.8	73.1	68.6	63.6	58.2	52.9	48.1	43.8	40.1	36.9	34.2	31.8	2896
$M_{c.y.Rd}$ = 82.3	0.8	**82.3**	**82.3**	76.5	73.8	70.8	67.6	64.2	60.7	57.2	53.9	50.7	47.7	45.0	
$M_{c.z.Rd}$ = 23.1	0.6	**82.3**	**82.3**	**82.3**	77.6	76.0	74.3	72.6	70.9	69.1	67.2	65.3	63.4	61.5	
Class 1	0.4	**82.3**	**82.3**	**82.3**	**82.3**	**82.3**	**82.3**	78.2	77.4	76.6	75.9	75.2	74.4	73.7	
254x102x22	1.0	63.3	57.8	50.0	41.3	33.8	28.2	23.9	20.7	18.3	16.4	14.8	13.5	12.4	2841
$M_{c.y.Rd}$ = 67.8	0.8	**67.8**	61.5	57.0	51.3	45.1	39.3	34.3	30.3	27.0	24.3	22.1	20.3	18.7	
$M_{c.z.Rd}$ = 9.76	0.6	**67.8**	64.4	61.9	59.1	55.8	52.2	48.5	44.8	41.3	38.1	35.3	32.9	30.7	
Class 1	0.4	**67.8**	**67.8**	**67.8**	64.0	62.7	61.3	59.9	58.4	56.8	55.2	53.6	51.9	50.3	
254x102x25	1.0	75.0	69.1	61.0	51.7	43.2	36.5	31.4	27.4	24.3	21.9	19.9	18.2	16.8	3415
$M_{c.y.Rd}$ = 80.0	0.8	**80.0**	73.1	68.4	62.6	56.2	49.9	44.2	39.5	35.5	32.2	29.5	27.2	25.2	
$M_{c.z.Rd}$ = 12.0	0.6	**80.0**	**80.0**	73.6	70.7	67.4	63.9	60.1	56.3	52.6	49.2	46.0	43.1	40.4	
Class 1	0.4	**80.0**	**80.0**	**80.0**	76.0	74.6	73.2	71.7	70.3	68.8	67.2	65.7	64.1	62.4	
254x102x28	1.0	86.9	80.7	72.3	62.6	53.4	45.7	39.7	35.0	31.3	28.2	25.8	23.7	21.9	4005
$M_{c.y.Rd}$ = 92.4	0.8	**92.4**	85.0	80.1	74.2	67.7	61.1	55.0	49.7	45.1	41.2	37.9	35.1	32.6	
$M_{c.z.Rd}$ = 14.4	0.6	**92.4**	**92.4**	85.6	82.6	79.3	75.8	72.1	68.4	64.6	61.0	57.5	54.3	51.3	
Class 1	0.4	**92.4**	**92.4**	**92.4**	**92.4**	86.8	85.3	83.9	82.4	81.0	79.5	78.0	76.5	74.9	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

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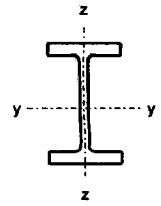
BENDING

UB SECTIONS SUBJECT TO BENDING



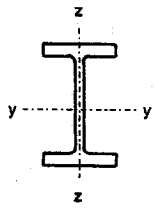
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b,Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
254x146x31	1.0	**103**	96.6	91.9	86.1	79.1	71.3	63.6	56.6	50.6	45.6	41.3	37.8	34.7	4413
$M_{c.y.Rd}$ = 103	0.8	**103**	**103**	96.0	92.4	88.4	83.7	78.5	73.1	67.8	62.7	58.0	53.9	50.1	
$M_{c.z.Rd}$ = 24.7	0.6	**103**	**103**	**103**	97.1	94.9	92.5	89.9	87.2	84.3	81.3	78.2	75.0	71.9	
Class 1	0.4	**103**	**103**	**103**	**103**	**103**	**103**	97.3	96.2	95.0	93.8	92.6	91.4	90.2	
254x146x37	1.0	**127**	119	114	108	100	92.2	83.9	76.0	69.0	62.9	57.6	53.1	49.2	5537
$M_{c.y.Rd}$ = 127	0.8	**127**	**127**	119	115	110	106	100	95.0	89.4	83.9	78.8	74.0	69.5	
$M_{c.z.Rd}$ = 31.3	0.6	**127**	**127**	**127**	120	118	115	113	110	107	104	101	97.9	94.8	
Class 1	0.4	**127**	**127**	**127**	**127**	**127**	**127**	121	119	118	117	116	115	113	
254x146x43	1.0	**148**	140	134	128	120	112	103	94.5	86.8	79.9	73.8	68.5	63.8	6544
$M_{c.y.Rd}$ = 148	0.8	**148**	**148**	140	135	131	126	121	115	110	104	98.5	93.3	88.4	
$M_{c.z.Rd}$ = 36.9	0.6	**148**	**148**	**148**	141	139	136	133	131	128	125	122	119	116	
Class 1	0.4	**148**	**148**	**148**	**148**	**148**	**148**	**148**	141	139	138	137	136	135	
305x102x25	1.0	83.1	75.1	63.5	51.1	40.9	33.5	28.1	24.1	21.1	18.7	16.9	15.3	14.0	4455
$M_{c.y.Rd}$ = 89.6	0.8	**89.6**	80.5	73.7	65.1	55.9	47.6	40.9	35.6	31.5	28.1	25.4	23.2	21.3	
$M_{c.z.Rd}$ = 10.2	0.6	**89.6**	84.6	81.0	76.6	71.5	65.9	60.0	54.5	49.5	45.2	41.4	38.2	35.4	
Class 1	0.4	**89.6**	**89.6**	**89.6**	84.0	81.9	79.8	77.5	75.0	72.5	69.8	67.1	64.4	61.8	
305x102x28	1.0	98.5	90.0	78.0	64.4	52.6	43.7	37.1	32.1	28.2	25.2	22.8	20.8	19.1	5366
$M_{c.y.Rd}$ = 106	0.8	**106**	95.8	88.8	79.9	70.2	61.0	53.2	46.8	41.7	37.5	34.1	31.2	28.8	
$M_{c.z.Rd}$ = 12.7	0.6	**106**	100	96.3	91.9	86.8	81.2	75.2	69.4	63.9	58.9	54.5	50.6	47.2	
Class 1	0.4	**106**	**106**	**106**	99.6	97.5	95.3	93.1	90.7	88.2	85.7	83.1	80.4	77.8	
305x102x33	1.0	118	109	96.2	81.5	68.2	57.6	49.5	43.2	38.4	34.5	31.3	28.7	26.5	6501
$M_{c.y.Rd}$ = 126	0.8	**126**	115	108	98.7	88.6	78.6	69.8	62.3	56.0	50.8	46.5	42.8	39.7	
$M_{c.z.Rd}$ = 15.7	0.6	**126**	**126**	116	111	106	101	94.7	88.7	82.9	77.5	72.4	67.9	63.7	
Class 1	0.4	**126**	**126**	**126**	120	117	115	113	111	108	106	103	101	98.3	
305x127x37	1.0	**141**	128	119	107	94.2	81.8	71.3	62.7	55.8	50.2	45.6	41.7	38.5	7171
$M_{c.y.Rd}$ = 141	0.8	**141**	133	127	121	113	104	94.8	86.3	78.6	71.9	66.1	61.1	56.8	
$M_{c.z.Rd}$ = 22.4	0.6	**141**	**141**	134	130	126	121	117	112	107	101	96.2	91.3	86.6	
Class 1	0.4	**141**	**141**	**141**	**141**	**141**	133	131	129	127	125	123	121	119	
305x127x42	1.0	**161**	147	137	124	111	97.6	86.0	76.4	68.4	61.9	56.5	51.9	48.0	8196
$M_{c.y.Rd}$ = 161	0.8	**161**	152	146	138	130	121	112	103	95.0	87.6	81.1	75.3	70.3	
$M_{c.z.Rd}$ = 25.8	0.6	**161**	**161**	152	148	144	140	135	130	125	120	115	110	105	
Class 1	0.4	**161**	**161**	**161**	**161**	**161**	152	150	148	146	144	142	140	138	
305x127x48	1.0	**186**	171	160	148	133	119	107	95.9	86.7	78.9	72.4	66.9	62.1	9575
$M_{c.y.Rd}$ = 186	0.8	**186**	176	170	162	154	145	136	127	118	110	102	95.7	89.8	
$M_{c.z.Rd}$ = 30.4	0.6	**186**	**186**	177	173	169	164	160	155	150	145	139	134	129	
Class 1	0.4	**186**	**186**	**186**	**186**	**186**	177	175	173	171	169	167	165	163	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



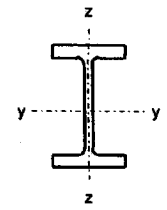
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
305x165x40	1.0	**163**	**163**	149	142	133	123	112	101	90.6	81.7	74.1	67.6	62.1	8503
$M_{c.y.Rd}$ = 163	0.8	**163**	**163**	155	150	145	139	132	124	117	109	101	94.4	88.0	
$M_{c.z.Rd}$ = 37.1	0.6	**163**	**163**	**163**	**163**	153	150	146	143	139	134	130	126	121	
Class 1	0.4	**163**	**163**	**163**	**163**	**163**	**163**	**163**	154	153	151	149	147	146	
305x165x46	1.0	**189**	**189**	173	165	156	145	133	121	110	100	91.8	84.3	77.9	9899
$M_{c.y.Rd}$ = 189	0.8	**189**	**189**	179	174	168	162	155	147	139	131	123	116	109	
$M_{c.z.Rd}$ = 43.4	0.6	**189**	**189**	**189**	**189**	177	174	170	166	162	158	154	149	145	
Class 1	0.4	**189**	**189**	**189**	**189**	**189**	**189**	**189**	179	177	176	174	172	170	
305x165x54	1.0	**222**	**222**	204	196	186	174	162	149	137	126	116	108	100	11700
$M_{c.y.Rd}$ = 222	0.8	**222**	**222**	211	205	199	192	185	177	169	161	153	145	137	
$M_{c.z.Rd}$ = 51.2	0.6	**222**	**222**	**222**	**222**	209	205	202	198	194	190	185	181	176	
Class 1	0.4	**222**	**222**	**222**	**222**	**222**	**222**	**222**	**222**	210	208	206	204	202	
356x127x33	1.0	**142**	128	117	103	87.1	73.1	61.8	53.1	46.2	40.8	36.5	33.0	30.1	8249
$M_{c.y.Rd}$ = 142	0.8	**142**	133	127	118	108	96.6	85.4	75.5	67.0	60.0	54.1	49.3	45.2	
$M_{c.z.Rd}$ = 18.4	0.6	**142**	**142**	134	129	124	118	112	104	97.3	90.3	83.7	77.8	72.4	
Class 1	0.4	**142**	**142**	**142**	**142**	134	132	129	127	124	121	118	115	111	
356x127x39	1.0	**172**	157	145	129	112	95.9	82.4	71.6	63.1	56.2	50.6	46.1	42.3	10170
$M_{c.y.Rd}$ = 172	0.8	**172**	162	155	146	135	123	111	99.9	90.0	81.5	74.2	68.1	62.8	
$M_{c.z.Rd}$ = 23.3	0.6	**172**	**172**	163	158	153	147	140	133	125	118	111	104	98.2	
Class 1	0.4	**172**	**172**	**172**	**172**	164	161	159	156	153	150	147	144	141	
356x171x45	1.0	**203**	193	185	176	164	150	135	121	107	96.0	86.3	78.2	71.3	12070
$M_{c.y.Rd}$ = 203	0.8	**203**	**203**	192	186	179	171	162	151	141	130	120	111	102	
$M_{c.z.Rd}$ = 38.4	0.6	**203**	**203**	**203**	**203**	190	185	181	176	170	164	158	151	145	
Class 1	0.4	**203**	**203**	**203**	**203**	**203**	**203**	**203**	191	189	186	184	181	179	
356x171x51	1.0	**235**	**235**	216	205	193	178	162	146	132	119	108	98.0	89.9	14140
$M_{c.y.Rd}$ = 235	0.8	**235**	**235**	223	216	209	200	191	180	169	158	147	137	127	
$M_{c.z.Rd}$ = 45.6	0.6	**235**	**235**	**235**	**235**	220	216	211	206	200	194	188	181	175	
Class 1	0.4	**235**	**235**	**235**	**235**	**235**	**235**	**235**	222	220	217	215	212	210	
356x171x57	1.0	**265**	**265**	244	233	220	204	188	171	155	141	128	118	108	16040
$M_{c.y.Rd}$ = 265	0.8	**265**	**265**	251	244	237	228	218	207	196	184	173	162	152	
$M_{c.z.Rd}$ = 52.1	0.6	**265**	**265**	**265**	**265**	249	244	239	234	228	222	216	209	203	
Class 1	0.4	**265**	**265**	**265**	**265**	**265**	**265**	**265**	251	249	246	244	241	239	
356x171x67	1.0	**317**	**317**	293	281	267	251	234	216	199	183	169	156	145	19460
$M_{c.y.Rd}$ = 317	0.8	**317**	**317**	**317**	295	286	277	267	256	244	232	220	209	198	
$M_{c.z.Rd}$ = 63.6	0.6	**317**	**317**	**317**	**317**	300	295	289	284	278	272	266	260	253	
Class 1	0.4	**317**	**317**	**317**	**317**	**317**	**317**	**317**	**317**	300	298	295	293	290	
406x140x39	1.0	**190**	174	163	147	128	109	92.5	79.2	68.6	60.2	53.5	48.0	43.5	12510
$M_{c.y.Rd}$ = 190	0.8	**190**	180	173	163	152	139	124	110	98.0	87.5	78.6	71.2	64.9	
$M_{c.z.Rd}$ = 23.8	0.6	**190**	**190**	180	175	169	163	155	146	137	128	119	110	103	
Class 1	0.4	**190**	**190**	**190**	**190**	**190**	178	175	171	168	164	160	156	152	
406x140x46	1.0	**232**	215	203	186	165	144	124	108	94.5	83.7	75.0	67.8	61.9	15690
$M_{c.y.Rd}$ = 232	0.8	**232**	**232**	214	204	192	177	162	147	132	120	109	99.5	91.4	
$M_{c.z.Rd}$ = 30.9	0.6	**232**	**232**	**232**	217	210	203	195	187	177	168	158	149	140	
Class 1	0.4	**232**	**232**	**232**	**232**	**232**	220	216	213	210	206	202	198	194	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



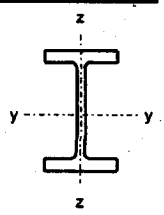
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
406x178x54	1.0	**276**	**276**	254	242	226	208	188	168	150	134	120	109	99.1	18720
$M_{c.y.Rd}$ = 276	0.8	**276**	**276**	262	254	245	235	222	209	194	180	166	153	142	
$M_{c.z.Rd}$ = 46.7	0.6	**276**	**276**	**276**	**276**	259	253	247	240	233	225	217	208	199	
Class 1	0.4	**276**	**276**	**276**	**276**	**276**	**276**	**276**	261	258	254	251	248	244	
406x178x60	1.0	**314**	**314**	290	277	261	242	221	200	180	162	146	133	122	21600
$M_{c.y.Rd}$ = 314	0.8	**314**	**314**	299	291	281	270	257	244	229	214	199	185	172	
$M_{c.z.Rd}$ = 54.8	0.6	**314**	**314**	**314**	**314**	296	290	283	276	269	261	253	244	235	
Class 1	0.4	**314**	**314**	**314**	**314**	**314**	**314**	**314**	298	295	291	288	285	281	
406x178x67	1.0	**353**	**353**	326	312	295	275	253	231	209	190	173	158	145	24330
$M_{c.y.Rd}$ = 353	0.8	**353**	**353**	**353**	327	317	305	292	278	263	247	232	217	203	
$M_{c.z.Rd}$ = 62.0	0.6	**353**	**353**	**353**	**353**	333	326	320	312	305	297	288	280	271	
Class 1	0.4	**353**	**353**	**353**	**353**	**353**	**353**	**353**	335	332	329	325	322	318	
406x178x74	1.0	**393**	**393**	364	349	332	311	288	265	242	221	203	187	172	27310
$M_{c.y.Rd}$ = 393	0.8	**393**	**393**	**393**	365	355	343	329	315	299	284	268	252	238	
$M_{c.z.Rd}$ = 69.9	0.6	**393**	**393**	**393**	**393**	372	365	358	351	343	335	327	318	309	
Class 1	0.4	**393**	**393**	**393**	**393**	**393**	**393**	**393**	**393**	372	368	365	361	358	
457x152x52	1.0	**287**	268	253	233	209	182	157	136	119	105	93.2	83.8	76.1	21370
$M_{c.y.Rd}$ = 287	0.8	**287**	**287**	265	254	239	222	203	184	166	149	135	123	112	
$M_{c.z.Rd}$ = 34.9	0.6	**287**	**287**	**287**	269	261	252	243	232	221	208	196	184	173	
Class 1	0.4	**287**	**287**	**287**	**287**	**287**	272	268	264	259	255	250	245	240	
457x152x60	1.0	**337**	316	299	279	253	224	196	172	152	135	121	110	100	25500
$M_{c.y.Rd}$ = 337	0.8	**337**	**337**	313	301	286	268	248	228	208	190	173	159	146	
$M_{c.z.Rd}$ = 42.7	0.6	**337**	**337**	**337**	317	309	300	290	279	268	256	243	231	218	
Class 1	0.4	**337**	**337**	**337**	**337**	**337**	321	317	312	308	303	298	293	288	
457x152x67	1.0	**381**	357	340	317	290	260	230	203	181	162	146	133	122	28930
$M_{c.y.Rd}$ = 381	0.8	**381**	**381**	355	341	325	307	287	265	244	225	207	191	177	
$M_{c.z.Rd}$ = 48.9	0.6	**381**	**381**	**381**	359	350	341	331	320	308	296	283	270	258	
Class 1	0.4	**381**	**381**	**381**	**381**	**381**	**381**	359	354	350	345	340	335	330	
457x152x74	1.0	**426**	401	382	359	331	299	268	239	214	193	175	160	147	32670
$M_{c.y.Rd}$ = 426	0.8	**426**	**426**	398	384	368	349	328	307	285	264	245	228	212	
$M_{c.z.Rd}$ = 55.8	0.6	**426**	**426**	**426**	403	394	384	374	363	351	339	327	314	301	
Class 1	0.4	**426**	**426**	**426**	**426**	**426**	**426**	404	399	394	389	385	380	375	
457x152x82	1.0	**474**	447	427	403	374	342	309	278	251	228	208	191	176	36590
$M_{c.y.Rd}$ = 474	0.8	**474**	**474**	445	430	413	394	373	351	328	307	286	268	251	
$M_{c.z.Rd}$ = 63.0	0.6	**474**	**474**	**474**	450	440	430	420	409	397	385	373	360	348	
Class 1	0.4	**474**	**474**	**474**	**474**	**474**	**474**	451	446	441	437	432	427	422	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



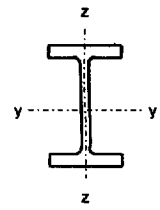
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b,Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
457x191x67	1.0	**385**	**385**	358	343	325	303	278	251	226	203	183	166	151	29380
$M_{c.y.Rd}$ = 385	0.8	**385**	**385**	**385**	359	347	335	320	303	285	266	248	230	214	
$M_{c.z.Rd}$ = 62.2	0.6	**385**	**385**	**385**	**385**	364	357	350	341	332	322	312	301	290	
Class 1	0.4	**385**	**385**	**385**	**385**	**385**	**385**	**385**	366	362	358	354	350	346	
457x191x74	1.0	**433**	**433**	403	387	368	345	319	291	264	239	217	198	181	33320
$M_{c.y.Rd}$ = 433	0.8	**433**	**433**	**433**	404	392	379	363	346	328	308	289	270	252	
$M_{c.z.Rd}$ = 71.3	0.6	**433**	**433**	**433**	**433**	410	403	395	386	377	367	357	346	334	
Class 1	0.4	**433**	**433**	**433**	**433**	**433**	**433**	**433**	**433**	409	405	400	396	392	
457x191x82	1.0	**480**	**480**	448	430	410	386	359	330	301	274	250	229	211	37050
$M_{c.y.Rd}$ = 480	0.8	**480**	**480**	**480**	449	436	422	406	388	369	349	329	310	291	
$M_{c.z.Rd}$ = 79.6	0.6	**480**	**480**	**480**	**480**	456	448	439	430	421	411	400	389	378	
Class 1	0.4	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	454	450	446	441	437	
457x191x89	1.0	**527**	**527**	493	475	454	429	401	371	341	313	287	265	245	41020
$M_{c.y.Rd}$ = 527	0.8	**527**	**527**	**527**	494	481	466	450	432	413	393	372	352	333	
$M_{c.z.Rd}$ = 88.6	0.6	**527**	**527**	**527**	**527**	502	494	485	476	466	456	446	435	423	
Class 1	0.4	**527**	**527**	**527**	**527**	**527**	**527**	**527**	**527**	501	497	492	488	483	
457x191x98	1.0	**585**	**585**	548	529	506	481	452	421	390	360	333	308	286	45730
$M_{c.y.Rd}$ = 585	0.8	**585**	**585**	**585**	549	535	520	503	485	466	446	425	404	384	
$M_{c.z.Rd}$ = 99.2	0.6	**585**	**585**	**585**	**585**	**585**	549	540	530	521	511	500	489	478	
Class 1	0.4	**585**	**585**	**585**	**585**	**585**	**585**	**585**	**585**	**585**	553	548	544	539	
533x210x82	1.0	**539**	**539**	506	487	465	438	406	371	336	303	273	247	225	47540
$M_{c.y.Rd}$ = 539	0.8	**539**	**539**	**539**	506	492	476	458	437	413	388	363	337	314	
$M_{c.z.Rd}$ = 78.7	0.6	**539**	**539**	**539**	**539**	514	504	494	484	472	459	446	431	416	
Class 1	0.4	**539**	**539**	**539**	**539**	**539**	**539**	**539**	**539**	510	505	499	493	488	
533x210x92	1.0	**618**	**618**	582	562	538	509	476	439	401	365	332	302	277	55230
$M_{c.y.Rd}$ = 618	0.8	**618**	**618**	**618**	583	567	550	531	509	485	459	432	406	380	
$M_{c.z.Rd}$ = 93.1	0.6	**618**	**618**	**618**	**618**	**618**	581	570	559	547	534	520	505	490	
Class 1	0.4	**618**	**618**	**618**	**618**	**618**	**618**	**618**	**618**	587	582	576	570	564	
533x210x101	1.0	**684**	**684**	645	624	598	568	534	495	456	417	382	350	321	61520
$M_{c.y.Rd}$ = 684	0.8	**684**	**684**	**684**	646	630	612	592	569	545	518	491	463	436	
$M_{c.z.Rd}$ = 105	0.6	**684**	**684**	**684**	**684**	**684**	644	633	621	609	596	582	567	552	
Class 1	0.4	**684**	**684**	**684**	**684**	**684**	**684**	**684**	**684**	**684**	646	640	634	628	
533x210x109	1.0	**741**	**741**	699	677	650	619	583	544	503	463	425	391	361	66820
$M_{c.y.Rd}$ = 741	0.8	**741**	**741**	**741**	700	683	665	644	621	596	569	541	512	484	
$M_{c.z.Rd}$ = 114	0.6	**741**	**741**	**741**	**741**	**741**	699	687	675	662	649	635	620	605	
Class 1	0.4	**741**	**741**	**741**	**741**	**741**	**741**	**741**	**741**	**741**	701	695	689	683	
533x210x122	1.0	**837**	**837**	792	767	739	706	669	628	586	543	503	466	432	76040
$M_{c.y.Rd}$ = 837	0.8	**837**	**837**	**837**	793	775	755	733	710	684	657	628	599	570	
$M_{c.z.Rd}$ = 131	0.6	**837**	**837**	**837**	**837**	**837**	792	780	767	754	740	726	711	696	
Class 1	0.4	**837**	**837**	**837**	**837**	**837**	**837**	**837**	**837**	**837**	795	789	783	776	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



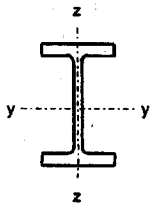
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
610x229x101	1.0	**755**	**755**	715	693	666	634	597	554	508	462	420	381	347	75780
$M_{c.y.Rd}$ = 755	0.8	**755**	**755**	**755**	716	699	679	657	632	604	573	540	506	473	
$M_{c.z.Rd}$ = 105	0.6	**755**	**755**	**755**	**755**	**755**	713	701	688	673	658	641	623	604	
Class 1	0.4	**755**	**755**	**755**	**755**	**755**	**755**	**755**	**755**	**755**	713	706	698	691	
610x229x113	1.0	**859**	**859**	817	792	764	730	690	645	596	547	501	458	420	87320
$M_{c.y.Rd}$ = 859	0.8	**859**	**859**	**859**	817	799	778	755	729	699	667	633	598	563	
$M_{c.z.Rd}$ = 123	0.6	**859**	**859**	**859**	**859**	**859**	815	801	787	773	757	740	721	702	
Class 1	0.4	**859**	**859**	**859**	**859**	**859**	**859**	**859**	**859**	**859**	815	807	800	792	
610x229x125	1.0	**963**	**963**	917	890	860	824	782	735	684	632	582	536	494	98610
$M_{c.y.Rd}$ = 963	0.8	**963**	**963**	**963**	**963**	898	876	851	824	793	761	726	689	653	
$M_{c.z.Rd}$ = 140	0.6	**963**	**963**	**963**	**963**	**963**	915	901	886	871	854	837	818	799	
Class 1	0.4	**963**	**963**	**963**	**963**	**963**	**963**	**963**	**963**	**963**	916	908	900	892	
610x229x140	1.0	**1080**	**1080**	**1080**	1010	973	935	891	842	789	734	681	630	584	111800
$M_{c.y.Rd}$ = 1080	0.8	**1080**	**1080**	**1080**	**1080**	1010	990	965	936	905	871	835	798	760	
$M_{c.z.Rd}$ = 160	0.6	**1080**	**1080**	**1080**	**1080**	**1080**	1030	1020	1000	986	969	952	933	914	
Class 1	0.4	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	1030	1020	1010	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



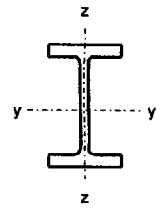
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
610x305x149	1.0	**1200**	1130	1080	1020	937	846	754	669	595	533	481	438	401	125900
$M_{c.y.Rd}$ = 1200	0.8	**1200**	**1200**	1130	1090	1040	986	925	861	796	734	677	625	580	
$M_{c.z.Rd}$ = 245	0.6	**1200**	**1200**	**1200**	1140	1110	1090	1050	1020	987	950	912	873	835	
Class 1	0.4	**1200**	**1200**	**1200**	**1200**	**1200**	**1200**	1140	1130	1110	1100	1080	1070	1050	
610x305x179	1.0	**1450**	1370	1310	1240	1150	1060	956	861	776	703	640	587	542	153000
$M_{c.y.Rd}$ = 1450	0.8	**1450**	**1450**	1360	1320	1270	1210	1150	1080	1010	946	882	824	771	
$M_{c.z.Rd}$ = 300	0.6	**1450**	**1450**	**1450**	1380	1350	1320	1290	1260	1220	1180	1150	1110	1070	
Class 1	0.4	**1450**	**1450**	**1450**	**1450**	**1450**	**1450**	1380	1370	1350	1340	1320	1310	1290	
610x305x238	1.0	**1960**	1860	1790	1710	1610	1510	1400	1290	1190	1100	1020	944	880	209500
$M_{c.y.Rd}$ = 1960	0.8	**1960**	**1960**	1850	1800	1740	1680	1620	1550	1480	1410	1340	1270	1210	
$M_{c.z.Rd}$ = 412	0.6	**1960**	**1960**	**1960**	**1960**	1840	1810	1770	1740	1710	1670	1630	1590	1560	
Class 1	0.4	**1960**	**1960**	**1960**	**1960**	**1960**	**1960**	**1960**	1870	1850	1830	1820	1800	1790	
686x254x125	1.0	**1050**	946	867	763	648	543	459	393	341	301	269	242	221	118000
$M_{c.y.Rd}$ = 1050	0.8	**1050**	983	935	874	799	716	633	558	495	442	398	362	331	
$M_{c.z.Rd}$ = 142	0.6	**1050**	**1050**	984	952	915	872	823	771	717	665	616	571	531	
Class 1	0.4	**1050**	**1050**	**1050**	**1050**	989	971	952	932	911	889	866	842	818	
686x254x140	1.0	**1190**	1080	1000	892	769	653	557	481	421	374	335	304	278	136300
$M_{c.y.Rd}$ = 1190	0.8	**1190**	1120	1070	1010	933	845	757	676	604	544	493	451	414	
$M_{c.z.Rd}$ = 167	0.6	**1190**	**1190**	1130	1090	1050	1010	961	908	853	799	747	698	654	
Class 1	0.4	**1190**	**1190**	**1190**	**1190**	1130	1110	1090	1070	1050	1030	1010	986	962	
686x254x152	1.0	**1310**	1190	1110	992	863	740	637	553	487	434	391	355	326	150400
$M_{c.y.Rd}$ = 1310	0.8	**1310**	1240	1180	1120	1040	947	855	769	693	628	572	524	484	
$M_{c.z.Rd}$ = 186	0.6	**1310**	**1310**	1240	1200	1160	1120	1070	1020	961	905	852	801	753	
Class 1	0.4	**1310**	**1310**	**1310**	**1310**	1250	1230	1210	1190	1170	1140	1120	1100	1080	
686x254x170	1.0	**1470**	1350	1250	1140	1000	868	755	661	586	525	475	434	399	170300
$M_{c.y.Rd}$ = 1470	0.8	**1470**	1390	1340	1270	1190	1090	999	907	825	752	690	636	589	
$M_{c.z.Rd}$ = 213	0.6	**1470**	**1470**	1400	1360	1320	1270	1220	1170	1110	1060	1000	951	900	
Class 1	0.4	**1470**	**1470**	**1470**	**1470**	**1470**	1390	1370	1350	1320	1300	1280	1260	1240	
762x267x134	1.0	**1220**	1100	1010	894	758	633	531	452	390	342	303	272	247	150700
$M_{c.y.Rd}$ = 1220	0.8	**1220**	1140	1090	1020	933	833	733	643	567	503	450	407	371	
$M_{c.z.Rd}$ = 149	0.6	**1220**	**1220**	1150	1110	1070	1010	955	892	826	761	701	647	598	
Class 1	0.4	**1220**	**1220**	**1220**	**1220**	1150	1130	1110	1080	1060	1030	999	969	938	
762x267x147	1.0	**1350**	1230	1130	1010	864	728	616	527	457	403	359	323	294	168500
$M_{c.y.Rd}$ = 1350	0.8	**1350**	1270	1220	1140	1050	947	841	744	660	589	530	481	440	
$M_{c.z.Rd}$ = 170	0.6	**1350**	**1350**	1280	1240	1190	1140	1080	1010	945	878	814	755	702	
Class 1	0.4	**1350**	**1350**	**1350**	**1350**	1280	1260	1230	1210	1180	1160	1130	1100	1070	
762x267x173	1.0	**1620**	1490	1380	1250	1090	934	801	694	609	540	485	440	402	205300
$M_{c.y.Rd}$ = 1620	0.8	**1620**	1540	1470	1390	1300	1190	1070	962	865	781	710	649	597	
$M_{c.z.Rd}$ = 211	0.6	**1620**	**1620**	1540	1500	1450	1390	1330	1260	1200	1120	1060	991	931	
Class 1	0.4	**1620**	**1620**	**1620**	**1620**	**1620**	1520	1500	1470	1450	1420	1390	1360	1330	
762x267x197	1.0	**1880**	1730	1610	1470	1300	1140	988	865	765	684	618	563	517	240000
$M_{c.y.Rd}$ = 1880	0.8	**1880**	1780	1710	1630	1530	1410	1300	1180	1070	977	894	823	762	
$M_{c.z.Rd}$ = 251	0.6	**1880**	**1880**	1790	1740	1690	1630	1570	1500	1430	1360	1290	1220	1160	
Class 1	0.4	**1880**	**1880**	**1880**	**1880**	**1880**	1770	1740	1720	1690	1660	1640	1610	1580	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



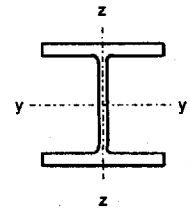
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres												Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
838x292x176	1.0	**1780**	1650	1550	1410	1240	1060	908	780	677	595	529	475	431	246000
$M_{c.y.Rd}$ = 1780	0.8	**1780**	**1780**	1630	1550	1450	1330	1200	1080	960	860	774	702	641	
$M_{c.z.Rd}$ = 220	0.6	**1780**	**1780**	**1780**	1660	1600	1540	1480	1400	1320	1240	1150	1080	1000	
Class 1	0.4	**1780**	**1780**	**1780**	**1780**	**1780**	1680	1650	1620	1590	1560	1520	1490	1450	
838x292x194	1.0	**2000**	1860	1750	1600	1430	1240	1070	924	808	714	637	575	523	279200
$M_{c.y.Rd}$ = 2000	0.8	**2000**	**2000**	1840	1760	1650	1530	1390	1260	1130	1020	926	844	774	
$M_{c.z.Rd}$ = 255	0.6	**2000**	**2000**	**2000**	1870	1810	1750	1680	1600	1520	1440	1350	1270	1190	
Class 1	0.4	**2000**	**2000**	**2000**	**2000**	**2000**	1890	1860	1830	1800	1770	1740	1700	1660	
838x292x226	1.0	**2400**	2240	2120	1960	1770	1570	1370	1200	1060	950	855	777	711	339700
$M_{c.y.Rd}$ = 2400	0.8	**2400**	**2400**	2220	2130	2020	1890	1750	1600	1460	1340	1230	1130	1040	
$M_{c.z.Rd}$ = 317	0.6	**2400**	**2400**	**2400**	2250	2190	2120	2050	1980	1900	1810	1720	1640	1550	
Class 1	0.4	**2400**	**2400**	**2400**	**2400**	**2400**	2280	2250	2220	2190	2150	2120	2090	2050	
914x305x201	1.0	**2190**	2030	1910	1760	1560	1350	1160	996	865	760	676	607	550	325300
$M_{c.y.Rd}$ = 2190	0.8	**2190**	**2190**	2010	1920	1810	1670	1520	1360	1220	1090	985	894	816	
$M_{c.z.Rd}$ = 257	0.6	**2190**	**2190**	**2190**	2040	1980	1910	1830	1750	1650	1550	1450	1360	1270	
Class 1	0.4	**2190**	**2190**	**2190**	**2190**	**2190**	2070	2030	2000	1960	1930	1890	1840	1800	
914x305x224	1.0	**2500**	2330	2200	2040	1830	1610	1390	1210	1060	938	838	756	688	376400
$M_{c.y.Rd}$ = 2500	0.8	**2500**	**2500**	2310	2210	2090	1950	1790	1630	1470	1330	1210	1100	1010	
$M_{c.z.Rd}$ = 305	0.6	**2500**	**2500**	**2500**	2340	2280	2200	2120	2040	1940	1840	1740	1640	1540	
Class 1	0.4	**2500**	**2500**	**2500**	**2500**	**2500**	2370	2340	2300	2260	2230	2190	2140	2100	
914x305x253	1.0	**2870**	2680	2550	2370	2150	1910	1680	1470	1300	1160	1040	946	865	436300
$M_{c.y.Rd}$ = 2870	0.8	**2870**	**2870**	2660	2560	2430	2280	2120	1950	1780	1630	1490	1370	1260	
$M_{c.z.Rd}$ = 359	0.6	**2870**	**2870**	**2870**	2690	2630	2550	2470	2380	2280	2180	2080	1980	1880	
Class 1	0.4	**2870**	**2870**	**2870**	**2870**	**2870**	**2870**	2690	2660	2620	2580	2540	2500	2460	
914x305x289	1.0	**3290**	3090	2940	2750	2520	2270	2010	1790	1590	1430	1300	1180	1090	504200
$M_{c.y.Rd}$ = 3290	0.8	**3290**	**3290**	3070	2950	2820	2670	2500	2320	2140	1980	1830	1690	1570	
$M_{c.z.Rd}$ = 419	0.6	**3290**	**3290**	**3290**	3110	3030	2950	2870	2780	2680	2580	2480	2370	2270	
Class 1	0.4	**3290**	**3290**	**3290**	**3290**	**3290**	**3290**	3110	3070	3030	2990	2950	2910	2870	
914x419x343	1.0	**4050**	**4050**	3830	3710	3570	3410	3220	3010	2790	2570	2370	2180	2010	625800
$M_{c.y.Rd}$ = 4050	0.8	**4050**	**4050**	**4050**	3840	3750	3650	3540	3420	3280	3140	2990	2840	2690	
$M_{c.z.Rd}$ = 757	0.6	**4050**	**4050**	**4050**	**4050**	**4050**	3830	3770	3700	3640	3560	3490	3410	3330	
Class 1	0.4	**4050**	**4050**	**4050**	**4050**	**4050**	**4050**	**4050**	**4050**	**4050**	3840	3810	3780	3740	
914x419x388	1.0	**4630**	**4630**	4380	4250	4100	3930	3730	3510	3280	3050	2830	2630	2440	719600
$M_{c.y.Rd}$ = 4630	0.8	**4630**	**4630**	**4630**	4390	4290	4190	4070	3940	3810	3660	3510	3350	3200	
$M_{c.z.Rd}$ = 875	0.6	**4630**	**4630**	**4630**	**4630**	**4630**	4380	4320	4250	4180	4110	4030	3950	3870	
Class 1	0.4	**4630**	**4630**	**4630**	**4630**	**4630**	**4630**	**4630**	**4630**	**4630**	4400	4370	4340	4300	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UC SECTIONS SUBJECT TO BENDING



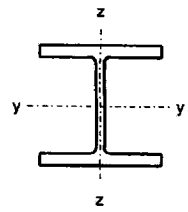
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
152x152x23	1.0	**43.0**	**43.0**	39.6	38.0	36.2	34.2	32.0	29.9	27.8	25.8	24.0	22.4	21.0	1250
$M_{c.y.Rd}$ = 43.0	0.8	**43.0**	**43.0**	40.9	39.8	38.7	37.5	36.3	35.0	33.6	32.2	30.8	29.5	28.1	
$M_{c.z.Rd}$ = 13.8	0.6	**43.0**	**43.0**	**43.0**	**43.0**	40.6	40.0	39.3	38.6	38.0	37.3	36.6	35.8	35.1	
Class 3	0.4	**43.0**	**43.0**	**43.0**	**43.0**	**43.0**	**43.0**	**43.0**	**43.0**	40.8	40.5	40.2	39.9	39.6	
152x152x30	1.0	**64.9**	**64.9**	59.8	57.6	55.2	52.6	49.8	47.1	44.3	41.7	39.2	36.9	34.8	1748
$M_{c.y.Rd}$ = 64.9	0.8	**64.9**	**64.9**	61.7	60.3	58.8	57.3	55.7	54.0	52.3	50.6	48.9	47.1	45.4	
$M_{c.z.Rd}$ = 29.2	0.6	**64.9**	**64.9**	**64.9**	**64.9**	61.5	60.7	59.8	58.9	58.1	57.2	56.4	55.5	54.6	
Class 1	0.4	**64.9**	**64.9**	**64.9**	**64.9**	**64.9**	**64.9**	**64.9**	**64.9**	**64.9**	61.6	61.2	60.8	60.4	
152x152x37	1.0	**80.9**	**80.9**	75.2	72.8	70.3	67.7	65.0	62.2	59.4	56.6	53.9	51.3	48.8	2210
$M_{c.y.Rd}$ = 80.9	0.8	**80.9**	**80.9**	**80.9**	75.8	74.2	72.6	71.1	69.4	67.8	66.1	64.4	62.6	60.9	
$M_{c.z.Rd}$ = 36.6	0.6	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	76.3	75.4	74.6	73.7	72.8	72.0	71.1	70.2	
Class 1	0.4	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	**80.9**	76.7	76.3	
203x203x46	1.0	**130**	**130**	**130**	121	118	114	110	105	101	96.2	91.5	87.0	82.6	4568
$M_{c.y.Rd}$ = 130	0.8	**130**	**130**	**130**	**130**	122	120	117	115	112	110	107	104	101	
$M_{c.z.Rd}$ = 60.5	0.6	**130**	**130**	**130**	**130**	**130**	**130**	123	122	120	119	117	116	115	
Class 2	0.4	**130**	**130**	**130**	**130**	**130**	**130**	**130**	**130**	**130**	**130**	**130**	**130**	124	
203x203x52	1.0	**149**	**149**	**149**	138	135	131	127	122	118	113	108	104	99.2	5259
$M_{c.y.Rd}$ = 149	0.8	**149**	**149**	**149**	**149**	140	137	135	132	130	127	124	121	118	
$M_{c.z.Rd}$ = 69.2	0.6	**149**	**149**	**149**	**149**	**149**	**149**	141	140	138	137	135	134	132	
Class 1	0.4	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	**149**	
203x203x60	1.0	**172**	**172**	**172**	161	157	153	149	144	140	135	130	125	121	6125
$M_{c.y.Rd}$ = 172	0.8	**172**	**172**	**172**	**172**	162	160	157	155	152	149	146	144	141	
$M_{c.z.Rd}$ = 80.0	0.6	**172**	**172**	**172**	**172**	**172**	**172**	**172**	162	161	159	158	156	155	
Class 1	0.4	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	
203x203x71	1.0	**209**	**209**	**209**	197	193	189	184	180	175	171	166	161	156	7618
$M_{c.y.Rd}$ = 209	0.8	**209**	**209**	**209**	**209**	199	196	193	191	188	185	183	180	177	
$M_{c.z.Rd}$ = 97.9	0.6	**209**	**209**	**209**	**209**	**209**	**209**	**209**	199	198	196	194	193	192	
Class 1	0.4	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	
203x203x86	1.0	**256**	**256**	**256**	242	238	233	229	225	220	216	211	206	201	9449
$M_{c.y.Rd}$ = 256	0.8	**256**	**256**	**256**	**256**	**256**	242	239	236	233	231	228	225	222	
$M_{c.z.Rd}$ = 119	0.6	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	244	242	240	239	237	
Class 1	0.4	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	**256**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UC SECTIONS SUBJECT TO BENDING



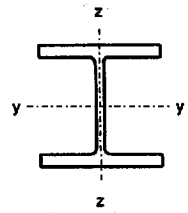
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
254x254x73	1.0	**260**	**260**	**260**	**260**	243	238	232	226	220	213	206	199	192	11410
$M_{c.y.Rd}$ = 260	0.8	**260**	**260**	**260**	**260**	**260**	246	242	238	235	231	227	223	218	
$M_{c.z.Rd}$ = 122	0.6	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	246	244	242	239	237	
Class 1	0.4	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	**260**	
254x254x89	1.0	**321**	**321**	**321**	**321**	301	295	289	283	277	270	263	256	248	14270
$M_{c.y.Rd}$ = 321	0.8	**321**	**321**	**321**	**321**	**321**	305	301	297	293	289	285	281	276	
$M_{c.z.Rd}$ = 151	0.6	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	305	303	301	298	296	
Class 1	0.4	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	**321**	
254x254x107	1.0	**389**	**389**	**389**	**389**	367	361	354	348	341	334	328	320	313	17510
$M_{c.y.Rd}$ = 389	0.8	**389**	**389**	**389**	**389**	**389**	**389**	367	363	359	355	350	346	342	
$M_{c.z.Rd}$ = 183	0.6	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	370	368	365	363	
Class 1	0.4	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	**389**	
254x254x132	1.0	**490**	**490**	**490**	**490**	465	458	452	445	438	431	424	417	410	22530
$M_{c.y.Rd}$ = 490	0.8	**490**	**490**	**490**	**490**	**490**	**490**	466	461	457	453	448	444	440	
$M_{c.z.Rd}$ = 230	0.6	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	465	462	
Class 1	0.4	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	
254x254x167	1.0	**635**	**635**	**635**	**635**	**635**	600	593	586	579	572	565	558	551	30000
$M_{c.y.Rd}$ = 635	0.8	**635**	**635**	**635**	**635**	**635**	**635**	**635**	604	599	595	590	586	582	
$M_{c.z.Rd}$ = 298	0.6	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	
Class 1	0.4	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	**635**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres												Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
305x305x97	1.0	**417**	397	383	367	348	328	306	285	264	245	228	213	199	22250
$M_{c.y.Rd}$ = 417	0.8	**417**	**417**	395	385	374	362	350	337	323	309	295	282	269	
$M_{c.z.Rd}$ = 190	0.6	**417**	**417**	**417**	**417**	393	387	380	373	367	360	353	345	338	
Class 2	0.4	**417**	**417**	**417**	**417**	**417**	**417**	**417**	**417**	395	392	389	386	383	
305x305x118	1.0	**513**	**513**	473	456	437	416	394	372	350	329	310	292	275	27670
$M_{c.y.Rd}$ = 513	0.8	**513**	**513**	488	477	465	453	440	427	414	400	386	372	358	
$M_{c.z.Rd}$ = 235	0.6	**513**	**513**	**513**	**513**	487	480	473	466	459	452	445	438	431	
Class 1	0.4	**513**	**513**	**513**	**513**	**513**	**513**	**513**	**513**	**513**	487	484	481	478	
305x305x137	1.0	**601**	**601**	558	540	520	500	478	456	433	411	390	370	351	32810
$M_{c.y.Rd}$ = 601	0.8	**601**	**601**	**601**	563	550	538	525	512	499	486	472	458	444	
$M_{c.z.Rd}$ = 276	0.6	**601**	**601**	**601**	**601**	**601**	566	559	553	546	539	532	525	518	
Class 1	0.4	**601**	**601**	**601**	**601**	**601**	**601**	**601**	**601**	**601**	**601**	572	568	565	
305x305x158	1.0	**702**	**702**	655	636	616	595	574	552	529	507	484	463	442	38750
$M_{c.y.Rd}$ = 702	0.8	**702**	**702**	**702**	660	648	635	622	610	597	583	570	556	542	
$M_{c.z.Rd}$ = 322	0.6	**702**	**702**	**702**	**702**	**702**	665	658	651	644	637	630	623	616	
Class 1	0.4	**702**	**702**	**702**	**702**	**702**	**702**	**702**	**702**	**702**	**702**	**702**	668	665	
305x305x198	1.0	**901**	**901**	848	827	807	786	765	743	721	698	675	653	630	50900
$M_{c.y.Rd}$ = 901	0.8	**901**	**901**	**901**	855	841	829	816	803	790	777	764	750	736	
$M_{c.z.Rd}$ = 414	0.6	**901**	**901**	**901**	**901**	**901**	**901**	854	847	840	832	825	818	812	
Class 1	0.4	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	**901**	
305x305x240	1.0	**1110**	**1110**	1050	1030	1010	991	970	948	926	903	881	857	834	64200
$M_{c.y.Rd}$ = 1110	0.8	**1110**	**1110**	**1110**	**1110**	1050	1040	1020	1010	996	983	970	956	943	
$M_{c.z.Rd}$ = 511	0.6	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	1060	1050	1040	1030	1030	1020	
Class 1	0.4	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	
305x305x283	1.0	**1340**	**1340**	**1340**	1250	1230	1210	1190	1170	1140	1120	1100	1080	1050	78870
$M_{c.y.Rd}$ = 1340	0.8	**1340**	**1340**	**1340**	**1340**	1270	1260	1240	1230	1220	1200	1190	1180	1160	
$M_{c.z.Rd}$ = 613	0.6	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	1270	1260	1260	1250	1240	
Class 1	0.4	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	
356x368x129	1.0	**593**	**593**	562	546	528	509	488	465	441	418	394	372	351	40250
$M_{c.y.Rd}$ = 593	0.8	**593**	**593**	**593**	563	552	540	528	514	501	486	471	456	441	
$M_{c.z.Rd}$ = 208	0.6	**593**	**593**	**593**	**593**	**593**	564	557	549	542	535	527	520	512	
Class 3	0.4	**593**	**593**	**593**	**593**	**593**	**593**	**593**	**593**	**593**	**593**	565	561	558	
356x368x153	1.0	**776**	**776**	734	713	690	665	639	610	581	552	523	496	470	48590
$M_{c.y.Rd}$ = 776	0.8	**776**	**776**	**776**	737	722	707	691	675	658	640	622	604	585	
$M_{c.z.Rd}$ = 376	0.6	**776**	**776**	**776**	**776**	**776**	738	729	720	711	702	693	684	675	
Class 1	0.4	**776**	**776**	**776**	**776**	**776**	**776**	**776**	**776**	**776**	**776**	**776**	737	733	
356x368x177	1.0	**905**	**905**	858	835	811	785	758	730	701	671	642	613	585	57120
$M_{c.y.Rd}$ = 905	0.8	**905**	**905**	**905**	861	845	830	813	797	780	763	745	727	708	
$M_{c.z.Rd}$ = 438	0.6	**905**	**905**	**905**	**905**	**905**	**905**	854	845	836	827	818	809	800	
Class 1	0.4	**905**	**905**	**905**	**905**	**905**	**905**	**905**	**905**	**905**	**905**	**905**	**905**	860	
356x368x202	1.0	**1040**	**1040**	988	964	939	913	886	858	829	799	769	739	710	66260
$M_{c.y.Rd}$ = 1040	0.8	**1040**	**1040**	**1040**	**1040**	976	960	944	927	910	893	875	857	839	
$M_{c.z.Rd}$ = 503	0.6	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	987	977	968	959	950	941	932	
Class 1	0.4	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	**1040**	

y - y is the major axis and z - z is the minor axis.
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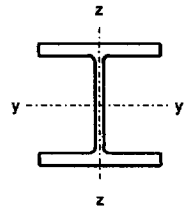
BENDING

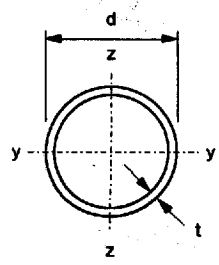
UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
356x406x235	1.0	**1230**	**1230**	**1230**	1150	1120	1100	1070	1040	1020	986	957	927	897	79080
$M_{c.y.Rd}$ = 1230	0.8	**1230**	**1230**	**1230**	**1230**	1160	1150	1130	1110	1100	1080	1060	1040	1030	
$M_{c.z.Rd}$ = 624	0.6	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	1160	1150	1140	1140	1130	1120	
Class 1	0.4	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	**1230**	
356x406x287	1.0	**1520**	**1520**	**1520**	1440	1410	1380	1350	1330	1300	1270	1240	1210	1180	99880
$M_{c.y.Rd}$ = 1520	0.8	**1520**	**1520**	**1520**	**1520**	**1520**	1430	1420	1400	1380	1360	1350	1330	1310	
$M_{c.z.Rd}$ = 772	0.6	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	1450	1440	1430	1420	1410	
Class 1	0.4	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	**1520**	
356x406x340	1.0	**1830**	**1830**	**1830**	1740	1710	1680	1650	1630	1600	1570	1540	1510	1480	122500
$M_{c.y.Rd}$ = 1830	0.8	**1830**	**1830**	**1830**	**1830**	**1830**	1740	1720	1700	1690	1670	1650	1630	1620	
$M_{c.z.Rd}$ = 928	0.6	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	1740	1730	1720	1710	
Class 1	0.4	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	**1830**	
356x406x393	1.0	**2150**	**2150**	**2150**	**2150**	2020	1990	1970	1940	1910	1880	1850	1820	1790	146600
$M_{c.y.Rd}$ = 2150	0.8	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	2040	2020	2000	1980	1960	1950	1930	
$M_{c.z.Rd}$ = 1090	0.6	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	2050	2040	2030	
Class 1	0.4	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	**2150**	
356x406x467	1.0	**2620**	**2620**	**2620**	**2620**	2480	2450	2420	2390	2360	2330	2300	2280	2250	183000
$M_{c.y.Rd}$ = 2620	0.8	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	2500	2480	2460	2440	2420	2400	2380	
$M_{c.z.Rd}$ = 1320	0.6	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	2490	
Class 1	0.4	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	**2620**	
356x406x551	1.0	**2930**	**2930**	**2930**	**2930**	**2930**	2780	2750	2730	2700	2670	2650	2620	2600	226900
$M_{c.y.Rd}$ = 2930	0.8	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	2790	2770	2750	2740	2720	
$M_{c.z.Rd}$ = 1470	0.6	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	
Class 1	0.4	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	**2930**	
356x406x634	1.0	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	3270	3240	3210	3190	3160	3130	3110	274800
$M_{c.y.Rd}$ = 3460	0.8	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	3290	3270	3250	3240	
$M_{c.z.Rd}$ = 1730	0.6	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	
Class 1	0.4	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	**3460**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.



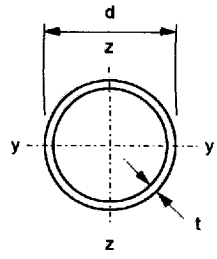
BENDING

CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
21.3	3.2 Δ	1.43	0.277	1	0.768
26.9	3.2 Δ	1.87	0.474	1	1.70
33.7	2.6 Δ	1.99	0.660	1	3.09
	3.2 Δ	2.41	0.782	1	3.60
	4.0 Δ	2.93	0.930	1	4.19
42.4	2.6 Δ	2.55	1.08	1	6.46
	3.2 Δ	3.09	1.29	1	7.62
	4.0 Δ	3.79	1.55	1	8.99
48.3	3.2	3.56	1.71	1	11.6
	4.0	4.37	2.06	1	13.8
	5.0	5.34	2.47	1	16.2
60.3	3.2	4.51	2.74	1	23.5
	4.0	5.55	3.33	1	28.2
	5.0	6.82	4.02	1	33.5
76.1	3.2	5.75	4.46	1	48.8
	4.0	7.11	5.45	1	59.1
	5.0	8.77	6.63	1	70.9
88.9	3.2	6.76	6.16	1	79.2
	4.0	8.38	7.56	1	96.3
	5.0	10.3	9.23	1	116
114.3	3.6	9.83	11.6	1	192
	5.0	13.5	15.7	1	257
	6.3	16.8	19.3	1	313
139.7	5.0	16.6	23.8	1	481
	6.3	20.7	29.4	1	589
	8.0	26.0	36.4	1	720
	10.0	32.0	44.1	1	862

Δ Sections marked thus are normally available in grade 275 only.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

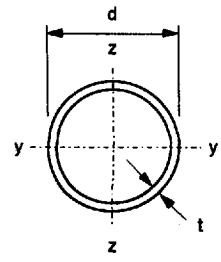
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
168.3	5.0	20.1	34.9	1	856
	6.3	25.2	43.3	1	1053
	8.0	31.6	53.9	1	1297
	10.0	39.0	65.7	1	1564
193.7	5.0	23.3	46.6	1	1320
	6.3	29.1	58.0	1	1630
	8.0	36.6	72.3	1	2016
	10.0	45.3	88.5	1	2442
	12.5	55.9	108	1	2934
	16.0 ♦	70.1	133	1	3554
219.1	5.0	26.4	60.0	2	1928
	6.3	33.1	74.7	1	2386
	8.0	41.6	93.4	1	2960
	10.0	51.6	115	1	3598
	12.5	63.7	140	1	4345
	16.0	80.1	173	1	5297
	20.0 ♦	98.2	208	1	6261
244.5	6.3	37.0	93.6	1	3346
	8.0	46.7	117	1	4160
	10.0	57.8	144	1	5073
	12.5	71.5	176	1	6147
	16.0	90.2	219	1	7533
	20.0 ♦	111	265	1	8957
	25.0 † ♦	135	317	1	10520
273.0	6.3	41.4	117	2	4696
	8.0	52.3	147	1	5852
	10.0	64.9	181	1	7154
	12.5	80.3	222	1	8697
	16.0	101	277	1	10710
	20.0 ♦	125	336	1	12800
	25.0 ♦	153	404	1	15130

† Sections marked thus are not included in BS4848: Part 2.

♦ Check availability of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

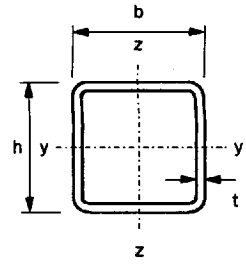
CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
323.9	6.3	49.3	166	2	7929
	8.0	62.3	209	1	9910
	10.0	77.4	258	1	12160
	12.5	96.0	318	1	14850
	16.0	121	398	1	18390
	20.0 ♦	150	484	1	22140
	25.0 ♦	184	586	1	26400
355.6	8.0	68.6	253	2	13200
	10.0	85.2	313	1	16220
	12.5	106	386	1	19850
	16.0	134	484	1	24660
	20.0 ♦	166	591	1	29790
	25.0 ♦	204	717	1	35680
406.4	10.0	97.8	412	1	24480
	12.5	121	508	1	30030
	16.0	154	639	1	37450
	20.0 ♦	191	783	1	45430
	25.0 ♦	235	954	1	54700
	32.0 ♦	295	1180	1	66430
457.0	10.0	110	523	2	35090
	12.5	137	647	1	43140
	16.0	174	815	1	53960
	20.0 ♦	216	1000	1	65680
	25.0 ♦	266	1220	1	79420
	32.0 ♦	335	1520	1	97010
	40.0 ♦	411	1830	1	114900
508.0	10.0	123	650	2	48520
	12.5	153	804	1	59760
	16.0	194	1010	1	74910
	20.0 ♦	241	1250	1	91430
	25.0 ♦	298	1530	1	110900
	32.0 ♦	376	1900	1	136100
	40.0 ♦	462	2300	1	162200
	50.0 ♦	565	2560	1	190900

♦ Check availability of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



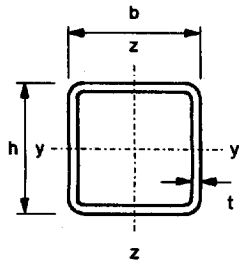
BENDING

SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size	Thickness				
h x b	t		$M_{c.Rd}$		I
mm.mm	mm	kg/m	kNm		cm^4
20x20	2.0	1.12	0.249	1	0.759
	2.5	1.35	0.292	1	0.865
25x25	2.0	1.43	0.409	1	1.59
	2.5	1.74	0.487	1	1.85
	3.0	2.04	0.555	1	2.06
	3.2	2.15	0.580	1	2.14
30x30	2.5	2.14	0.730	1	3.40
	3.0	2.51	0.841	1	3.84
	3.2	2.65	0.882	1	4.00
40x40	2.5	2.92	1.36	1	8.67
	3.0	3.45	1.59	1	9.96
	3.2	3.66	1.68	1	10.4
	4.0	4.46	1.99	1	12.1
	5.0	5.40	2.34	1	13.8
50x50	2.5	3.71	2.20	1	17.7
	3.0	4.39	2.57	1	20.5
	3.2	4.66	2.72	1	21.6
	4.0	5.72	3.27	1	25.5
	5.0	6.97	3.89	1	29.6
	6.3	8.49	4.59	1	33.9
60x60	3.0	5.34	3.79	1	36.6
	3.2	5.67	4.02	1	38.7
	4.0	6.97	4.86	1	46.1
	5.0	8.54	5.84	1	54.4
	6.3	10.5	6.98	1	63.4
	8.0	12.8	8.23	1	72.4
70x70	3.0	6.28	5.25	1	59.6
	3.6	7.46	6.18	1	69.5
	5.0	10.1	8.18	1	90.1
	6.3	12.5	9.86	1	106
	8.0	15.3	11.8	1	123
80x80	3.0	7.22	6.94	1	90.6
	3.6	8.59	8.19	1	106
	5.0	11.7	10.9	1	139
	6.3	14.4	13.2	1	165
	8.0	17.8	15.9	1	194
90x90	3.6	9.72	10.5	1	154
	5.0	13.3	14.0	1	202
	6.3	16.4	17.1	1	242
	8.0	20.4	20.7	1	288

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

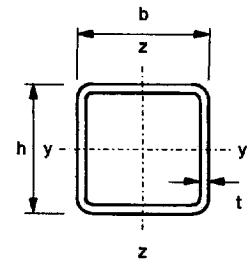
SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size	Thickness				
h x b mm.mm	t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
100x100	4.0	12.0	14.4	1	234
	5.0	14.8	17.6	1	283
	6.3	18.4	21.5	1	341
	8.0	22.9	26.2	1	408
	10.0	27.9	31.1	1	474
120x120	4.0	14.5	21.0	1	413
	5.0	18.0	25.8	1	503
	6.3	22.3	31.7	1	610
	8.0	27.9	38.9	1	738
	10.0	34.2	46.7	1	870
	12.5	41.6	55.5	1	1009
140x140	5.0 †	21.1	35.6	1	814
	6.3 †	26.3	43.9	1	994
	8.0 †	32.9	54.2	1	1212
	10.0 †	40.4	65.5	1	1441
	12.5 †	49.5	78.4	1	1691
150x150	5.0	22.7	41.1	1	1009
	6.3	28.3	50.7	1	1236
	8.0	35.4	62.7	1	1510
	10.0	43.6	76.0	1	1803
	12.5	53.4	91.3	1	2125
	16.0	66.4	110	1	2500
160x160	5.0 †	24.2	46.9	1	1234
	6.0 †	28.9	55.5	1	1450
	6.3 †	30.3	58.1	1	1513
	8.0 †	37.9	71.9	1	1853
	10.0 †	46.7	87.3	1	2219
	12.5 †	57.3	105	1	2627
180x180	5.0 †	27.4	59.9	2	1777
	6.3	34.2	74.2	1	2186
	8.0	43.0	92.2	1	2689
	10.0	53.0	112	1	3237
	12.5	65.2	136	1	3856
	16.0	81.4	166	1	4607
200x200	5.0 †	30.5	64.4	3	2460
	6.3	38.2	92.3	1	3033
	8.0	48.0	115	1	3744
	10.0	59.3	141	1	4525
	12.5	73.0	171	1	5419
	16.0	91.5	209	1	6524
250x250	6.3	48.1	127	3	6049
	8.0	60.5	183	1	7510
	10.0	75.0	225	1	9141
	12.5	92.6	274	1	11050
	16.0	117	340	1	13480

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



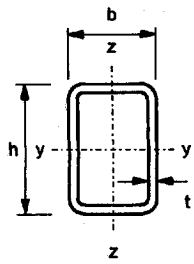
BENDING

SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size h x b mm.mm	Thickness t mm	 kg/m	 $M_{c.Rd}$ kNm		 I cm^4
300x300	6.3 †	57.9	171	4	10600
	8.0	73.1	267	2	13210
	10.0	90.7	328	1	16150
	12.5	112	403	1	19630
	16.0	142	502	1	24160
350x350	8.0	85.7	303	4	21240
	10.0	106	452	2	26050
	12.5	132	556	1	31810
	16.0	167	695	1	39370
400x400	10.0	122	515	3	39350
	12.5	152	733	1	48190
	16.0	192	920	1	59910
	20.0	237	1120	1	72390

† Sections marked thus are not included in BS4848: Part 2.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING

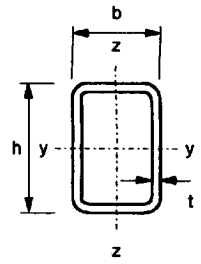
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size	Thickness							
h x b	t		$M_{c.y.Rd}$	$M_{c.z.Rd}$	L_c	y - y	z - z	I_y
mm.mm	mm	kg/m	kNm	kNm	m			cm^4
50x25	2.5	2.72	1.42	0.855	3.45	1	1	10.6
	3.0	3.22	1.65	0.987	3.36	1	1	12.2
	3.2	3.41	1.74	1.04	3.32	1	1	12.8
50x30	2.5	2.92	1.57	1.09	5.27	1	1	12.0
	3.0	3.45	1.84	1.27	5.17	1	1	13.9
	3.2	3.66	1.94	1.33	5.12	1	1	14.5
	4.0	4.46	2.31	1.57	4.95	1	1	17.0
	5.0	5.40	2.71	1.83	4.74	1	1	19.5
60x40	2.5	3.71	2.47	1.86	8.39	1	1	23.1
	3.0	4.39	2.90	2.17	8.27	1	1	26.9
	3.2	4.66	3.06	2.29	8.23	1	1	28.3
	4.0	5.72	3.69	2.75	8.04	1	1	33.6
	5.0	6.97	4.40	3.25	7.80	1	1	39.2
	6.3	8.49	5.20	3.81	7.49	1	1	45.1
80x40	3.0	5.34	4.52	2.75	5.71	1	1	55.0
	3.2	5.67	4.79	2.91	5.67	1	1	58.1
	4.0	6.97	5.81	3.50	5.52	1	1	69.6
	5.0	8.54	6.99	4.17	5.34	1	1	82.4
	6.3	10.5	8.37	4.92	5.10	1	1	96.5
	8.0	12.8	9.91	5.71	4.80	1	1	111
90x50	3.0	6.28	6.13	4.05	8.20	1	1	85.4
	3.6	7.46	7.22	4.75	8.08	1	1	99.8
	5.0	10.1	9.59	6.25	7.80	1	1	130
	6.3	12.5	11.6	7.47	7.54	1	1	154
	8.0	15.3	13.9	8.84	7.20	1	1	180
100x50	3.0	6.75	7.22	4.42	7.27	1	1	111
	3.2	7.18	7.66	4.68	7.23	1	1	117
	4.0	8.86	9.35	5.68	7.09	1	1	142
	5.0	10.9	11.3	6.84	6.90	1	1	170
	6.3	13.4	13.7	8.19	6.67	1	1	202
	8.0	16.6	16.5	9.72	6.36	1	1	238
100x60	3.0	7.22	7.98	5.59	11.0	1	1	125
	3.6	8.59	9.42	6.57	10.8	1	1	147
	5.0	11.7	12.6	8.72	10.5	1	1	192
	6.3	14.4	15.3	10.5	10.3	1	1	230
	8.0	17.8	18.5	12.6	9.90	1	1	272
120x60	3.6	9.72	12.5	7.64	8.72	1	1	230
	5.0	13.3	16.7	10.2	8.47	1	1	304
	6.3	16.4	20.4	12.3	8.23	1	1	366
	8.0	20.4	24.8	14.8	7.92	1	1	437

y - y is the major axis and z - z is the minor axis.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
120x80	5.0	14.8	19.8	14.8	16.8	1	1	370
	6.3	18.4	24.2	18.1	16.5	1	1	447
	8.0	22.9	29.5	22.0	16.1	1	1	537
	10.0	27.9	35.2	26.0	15.6	1	1	628
150x100	5.0	18.7	31.6	23.8	21.3	1	1	747
	6.3	23.3	38.9	29.2	21.0	1	1	910
	8.0	29.1	47.9	35.8	20.6	1	1	1106
	10.0	35.7	57.7	42.9	20.1	1	1	1312
	12.5	43.6	68.8	50.8	19.5	1	1	1532
160x80	5.0	18.0	30.7	18.8	11.6	1	1	753
	6.3	22.3	37.8	23.0	11.4	1	1	917
	8.0	27.9	46.5	28.0	11.0	1	1	1113
	10.0	34.2	55.9	33.4	10.7	1	1	1318
	12.5	41.6	66.5	39.2	10.2	1	1	1536
200x100	5.0	22.7	48.8	26.6	14.7	1	3	1509
	6.3	28.3	60.4	36.9	14.5	1	1	1851
	8.0	35.4	74.8	45.4	14.2	1	1	2269
	10.0	43.6	90.7	54.7	13.8	1	1	2718
	12.5	53.4	109	65.2	13.3	1	1	3218
	16.0	66.4	132	77.7	12.7	1	1	3808
200x120	5.0 †	24.2	53.9	33.5	22.2	1	3	1699
	6.0 †	28.9	63.9	44.7	21.9	1	1	2000
	6.3 †	30.3	66.8	46.7	21.9	1	1	2087
	8.0 †	37.9	82.8	57.7	21.5	1	1	2564
	10.0 †	46.7	101	69.8	21.1	1	1	3079
	12.5 †	57.3	121	83.6	20.6	1	1	3658
200x150	5.0 †	26.6	61.6	44.4	40.1	1	3	1984
	6.3 †	33.2	76.4	62.6	39.8	1	1	2442
	8.0 †	41.7	94.9	77.6	39.3	1	1	3006
	10.0 †	51.4	116	94.3	38.8	1	1	3621
	12.5 †	63.2	140	114	38.1	1	1	4318
	16.0 †	78.9	171	138	37.2	1	1	5166
250x100	6.3 †	33.2	86.0	39.6	11.6	1	3	3242
	8.0 †	41.7	107	55.1	11.3	1	1	3995
	10.0 †	51.4	130	66.5	11.0	1	1	4818
	12.5 †	63.2	158	79.5	10.6	1	1	5754
	16.0 †	78.9	193	95.3	10.1	1	1	6895
250x150	5.0 †	30.5	85.4	47.7	28.0	1	4	3382
	6.3	38.2	106	65.9	27.7	1	3	4178
	8.0	48.0	132	92.5	27.3	1	1	5167
	10.0	59.3	162	113	26.9	1	1	6259
	12.5	73.0	197	136	26.4	1	1	7518
	16.0	91.5	242	166	25.6	1	1	9089

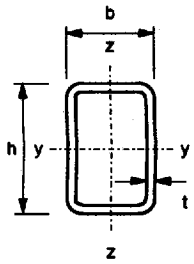
y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size	Thickness							
h x b	t		$M_{c.y.Rd}$	$M_{c.z.Rd}$	L_c	y - y	z - z	I_y
mm.mm	mm	kg/m	kNm	kNm	m			cm^4
260x140	6.3 †	38.2	108	62.5	22.5	1	3	4392
	8.0 †	48.0	135	87.4	22.2	1	1	5434
	10.0 †	59.3	165	106	21.8	1	1	6583
	12.5 †	73.0	201	128	21.3	1	1	7909
	16.0 †	91.5	247	157	20.6	1	1	9565
300x100	6.3 †	38.2	116	42.2	9.82	1	4	5162
	8.0 †	48.0	144	64.7	9.58	1	2	6386
	10.0 †	59.3	177	78.3	9.30	1	1	7738
	12.5 †	73.0	215	93.8	8.96	1	1	9295
	16.0 †	91.5	264	113	8.49	1	1	11240
300x200	6.3	48.1	164	101	43.4	1	4	7880
	8.0	60.5	206	155	43.0	1	2	9798
	10.0	75.0	252	190	42.5	1	1	11940
	12.5	92.6	309	232	42.0	1	1	14460
	16.0	117	383	286	41.1	1	1	17700
300x250	6.3 †	53.0	161	134	102	3	4	9239
	8.0 †	66.8	236	208	87.2	1	2	11500
	10.0 †	82.8	290	256	86.5	1	1	14050
	12.5 †	102	356	313	85.7	1	1	17050
	16.0 †	129	442	389	84.6	1	1	20930
350x150	6.3 †	48.1	178	73.8	19.1	1	4	9551
	8.0 †	60.5	223	103	18.8	1	4	11880
	10.0 †	75.0	274	149	18.5	1	2	14490
	12.5 †	92.6	335	181	18.1	1	1	17560
	16.0 †	117	415	223	17.5	1	1	21500
350x250	8.0 †	73.1	295	196	60.9	1	4	16560
	10.0 †	90.7	363	288	60.4	1	2	20270
	12.5 †	112	445	352	59.8	1	1	24680
	16.0 †	142	555	438	58.9	1	1	30440
400x150	6.3 †	53.0	220	76.7	16.8	1	4	13350
	8.0 †	66.8	276	108	16.6	1	4	16630
	10.0 †	82.8	340	149	16.3	1	3	20340
	12.5 †	102	416	204	15.9	1	1	24720
	16.0 †	129	518	251	15.4	1	1	30400
400x200	6.3 †	57.9	253	110	30.1	1	4	15790
	8.0	73.1	317	155	29.8	1	4	19710
	10.0	90.7	391	213	29.4	1	3	24140
	12.5	112	480	293	29.0	1	1	29410
	16.0	142	598	364	28.3	1	1	36300
400x300	10.0 †	106	493	355	80.2	1	3	31750
	12.5 †	132	606	497	79.6	1	1	38800
	16.0 †	167	759	621	78.6	1	1	48100

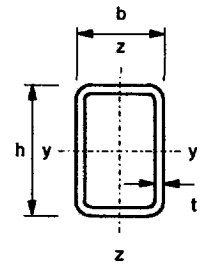
y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 275

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
450x250	8.0 †	85.7	427	214	42.4	1	4	30270
	10.0	106	527	292	42.0	1	4	37180
	12.5	132	649	430	41.5	1	2	45470
	16.0	167	813	536	40.8	1	1	56420
500x200	8.0 †	85.7	449	166	23.9	1	4	34270
	10.0 †	106	555	229	23.6	1	4	42110
	12.5 †	132	683	315	23.2	1	3	51510
	16.0 †	167	856	441	22.6	1	1	63930
500x300	10.0	122	683	382	55.9	1	4	54120
	12.5	152	843	523	55.4	1	3	66360
	16.0	192	1060	740	54.6	1	1	82670
	20.0 ∇	237	1290	901	53.8	1	1	100100

y - y is the major axis and z - z is the minor axis.

∇ Sections marked thus are normally available in grade S 355 only.

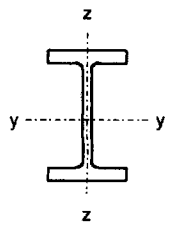
† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

Member resistances
Steel grade S 355

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



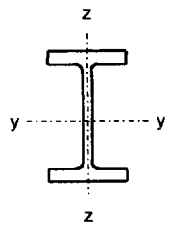
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation	Class	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)												
Cross section resistance (kN)		Axis	Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
127x76x13	1	y	553	537	518	495	464	426	380	333	288	249	216	188	165
$N_{c.Rd}$ = 559		z	434	310	207	143	104	78.4	61.2	49.0	40.1	33.4	28.3	24.3	21.0
152x89x16	2	y	686	671	653	633	608	578	540	495	447	399	353	313	277
$N_{c.Rd}$ = 687		z	567	439	312	221	162	123	96.6	77.6	63.7	53.2	45.1	38.7	33.5
178x102x19	2	y	**820**	809	792	773	752	726	695	658	615	567	517	468	422
$N_{c.Rd}$ = 820		z	706	580	438	321	239	183	144	116	95.6	79.9	67.8	58.3	50.6
203x102x23	3	y	**994**	987	969	950	929	905	877	844	806	761	711	658	604
$N_{c.Rd}$ = 994		z	854	701	527	385	287	220	173	139	115	95.9	81.3	69.9	60.6
203x133x25	2	y	**1080**	1070	1060	1030	1010	987	957	922	881	834	780	724	666
$N_{c.Rd}$ = 1080		z	991	887	753	608	480	379	304	248	206	173	148	127	111
203x133x30	2	y	**1290**	1280	1260	1240	1210	1180	1150	1110	1060	1010	946	880	813
$N_{c.Rd}$ = 1290		z	1190	1070	916	746	592	470	378	309	256	216	184	159	138
254x102x22	4	y	**890**	**890**	880	867	853	838	822	803	782	758	730	699	664
$N_{c.Rd}$ = 890		z	739	576	412	293	215	164	128	103	84.6	70.6	59.8	51.4	44.5
254x102x25	4	y	**1040**	**1040**	1030	1010	995	978	959	938	914	887	856	821	782
$N_{c.Rd}$ = 1040		z	871	691	502	360	266	202	159	128	105	87.7	74.3	63.8	55.3
254x102x28	4	y	**1180**	**1180**	1170	1160	1140	1120	1100	1070	1050	1020	984	945	902
$N_{c.Rd}$ = 1180		z	1000	806	593	428	317	242	190	153	126	105	89.0	76.4	66.3
254x146x31	4	y	**1300**	**1300**	1290	1270	1250	1230	1210	1180	1150	1120	1080	1040	993
$N_{c.Rd}$ = 1300		z	1210	1110	969	811	658	529	429	352	293	248	211	182	159
254x146x37	4	y	**1570**	**1570**	1550	1530	1510	1480	1460	1430	1400	1360	1310	1270	1210
$N_{c.Rd}$ = 1570		z	1470	1340	1190	1000	821	665	541	445	371	314	268	232	202
254x146x43	2	y	**1850**	**1850**	1840	1810	1780	1750	1720	1690	1650	1600	1550	1500	1430
$N_{c.Rd}$ = 1850		z	1740	1590	1400	1190	973	788	642	528	441	372	318	275	240
305x102x25	4	y	**941**	**941**	939	929	917	905	893	879	864	848	830	809	787
$N_{c.Rd}$ = 941		z	777	601	427	303	222	169	132	106	87.2	72.8	61.7	53.0	45.9
305x102x28	4	y	**1090**	**1090**	**1090**	1080	1070	1050	1040	1020	1010	988	968	945	920
$N_{c.Rd}$ = 1090		z	916	725	526	377	278	212	166	134	110	91.7	77.7	66.7	57.9
305x102x33	4	y	**1310**	**1310**	**1310**	1300	1280	1270	1250	1230	1210	1190	1170	1140	1110
$N_{c.Rd}$ = 1310		z	1110	887	649	467	345	263	207	166	137	114	96.9	83.2	72.2
305x127x37	4	y	**1530**	**1530**	**1530**	1510	1490	1470	1450	1430	1410	1380	1350	1320	1280
$N_{c.Rd}$ = 1530		z	1370	1180	953	731	559	434	344	279	230	193	164	141	123
305x127x42	3	y	**1810**	**1810**	1800	1780	1760	1730	1710	1680	1650	1620	1580	1540	1500
$N_{c.Rd}$ = 1810		z	1610	1390	1110	851	649	503	399	323	267	224	190	163	142
305x127x48	2	y	**2070**	**2070**	**2070**	2040	2020	1990	1960	1930	1900	1860	1820	1770	1720
$N_{c.Rd}$ = 2070		z	1850	1600	1300	998	764	594	471	382	315	265	225	194	168

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



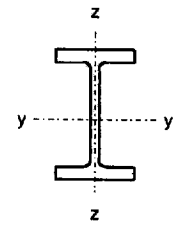
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
305x165x40	4	y	**1630**	**1630**	**1630**	1610	1600	1580	1560	1530	1510	1480	1460	1420	1390
$N_{c.Rd}$ = 1630		z	1550	1450	1320	1160	988	824	684	571	480	408	350	303	265
305x165x46	4	y	**1910**	**1910**	**1910**	1890	1870	1840	1820	1790	1770	1740	1700	1670	1620
$N_{c.Rd}$ = 1910		z	1820	1690	1540	1360	1160	965	802	668	562	478	410	355	311
305x165x54	3	y	**2320**	**2320**	**2320**	2300	2270	2240	2210	2180	2150	2110	2070	2020	1970
$N_{c.Rd}$ = 2320		z	2210	2060	1870	1640	1390	1160	958	797	670	569	488	423	370
356x127x33	4	y	**1240**	**1240**	**1240**	**1240**	1230	1210	1200	1190	1170	1160	1140	1120	1100
$N_{c.Rd}$ = 1240		z	1110	967	784	605	463	360	286	232	192	161	137	118	102
356x127x39	4	y	**1520**	**1520**	**1520**	**1520**	1500	1490	1470	1450	1440	1420	1400	1370	1350
$N_{c.Rd}$ = 1520		z	1370	1200	978	761	586	457	363	295	244	204	174	150	130
356x171x45	4	y	**1790**	**1790**	**1790**	1780	1770	1750	1730	1710	1690	1670	1640	1620	1590
$N_{c.Rd}$ = 1790		z	1700	1580	1430	1260	1070	885	733	610	512	435	373	323	282
356x171x51	4	y	**2060**	**2060**	**2060**	**2060**	2040	2020	2000	1970	1950	1920	1900	1870	1840
$N_{c.Rd}$ = 2060		z	1970	1830	1670	1470	1250	1040	867	723	608	517	443	384	336
356x171x57	4	y	**2350**	**2350**	**2350**	**2350**	2320	2300	2280	2250	2220	2190	2160	2130	2090
$N_{c.Rd}$ = 2350		z	2250	2090	1900	1680	1430	1190	991	827	695	591	507	440	384
356x171x67	4	y	**2840**	**2840**	**2840**	2830	2800	2780	2750	2720	2680	2650	2610	2570	2530
$N_{c.Rd}$ = 2840		z	2710	2530	2300	2040	1740	1460	1210	1010	852	725	622	539	472
406x140x39	4	y	**1420**	**1420**	**1420**	**1420**	1410	1400	1390	1380	1360	1350	1330	1320	1300
$N_{c.Rd}$ = 1420		z	1310	1170	997	806	637	504	405	330	274	230	196	169	147
406x140x46	4	y	**1740**	**1740**	**1740**	**1740**	1730	1710	1700	1680	1670	1650	1630	1610	1590
$N_{c.Rd}$ = 1740		z	1610	1450	1250	1030	818	652	525	430	357	301	256	221	193
406x178x54	4	y	**2120**	**2120**	**2120**	**2120**	2110	2090	2070	2050	2030	2010	1990	1960	1940
$N_{c.Rd}$ = 2120		z	2020	1890	1720	1520	1300	1090	908	758	638	543	466	404	353
406x178x60	4	y	**2380**	**2380**	**2380**	**2380**	2370	2350	2330	2310	2290	2260	2240	2210	2180
$N_{c.Rd}$ = 2380		z	2280	2130	1950	1740	1500	1260	1060	884	746	635	546	474	415
406x178x67	4	y	**2730**	**2730**	**2730**	**2730**	2710	2690	2670	2640	2620	2590	2560	2530	2500
$N_{c.Rd}$ = 2730		z	2610	2440	2230	1980	1710	1440	1200	1010	848	722	620	538	471
406x178x74	4	y	**3070**	**3070**	**3070**	**3070**	3050	3030	3000	2970	2940	2910	2880	2850	2810
$N_{c.Rd}$ = 3070		z	2940	2750	2520	2240	1930	1620	1360	1140	959	817	702	609	533
457x152x52	4	y	**1940**	**1940**	**1940**	**1940**	**1940**	1920	1910	1890	1880	1860	1840	1820	1810
$N_{c.Rd}$ = 1940		z	1800	1640	1430	1190	958	769	622	510	424	358	305	264	230
457x152x60	4	y	**2280**	**2280**	**2280**	**2280**	**2280**	2260	2240	2230	2210	2190	2170	2150	2130
$N_{c.Rd}$ = 2280		z	2130	1940	1700	1430	1160	936	760	624	520	439	375	324	282
457x152x67	4	y	**2630**	**2630**	**2630**	**2630**	**2630**	2610	2590	2570	2550	2530	2500	2480	2450
$N_{c.Rd}$ = 2630		z	2460	2240	1960	1650	1340	1080	873	717	597	504	431	372	324
457x152x74	4	y	**2970**	**2970**	**2970**	**2970**	2960	2940	2920	2900	2870	2850	2820	2790	2760
$N_{c.Rd}$ = 2970		z	2770	2530	2220	1870	1520	1230	998	821	684	577	493	426	371
457x152x82	4	y	**3360**	**3360**	**3360**	**3360**	**3360**	3330	3300	3280	3250	3220	3190	3160	3130
$N_{c.Rd}$ = 3360		z	3140	2860	2520	2120	1720	1390	1130	929	774	653	558	482	420

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



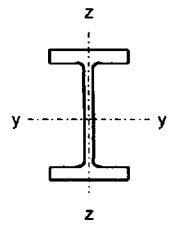
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
457x191x67	4	y	**2610**	**2610**	**2610**	**2610**	**2610**	2590	2570	2550	2530	2510	2480	2460	2440
$N_{c.Rd}$ = 2610		z	2510	2360	2180	1960	1720	1470	1240	1040	885	756	651	566	496
457x191x74	4	y	**2940**	**2940**	**2940**	**2940**	**2940**	2920	2900	2870	2850	2830	2800	2770	2750
$N_{c.Rd}$ = 2940		z	2840	2670	2470	2230	1950	1670	1420	1200	1010	867	747	650	569
457x191x82	4	y	**3320**	**3320**	**3320**	**3320**	**3320**	3300	3270	3240	3220	3190	3160	3130	3100
$N_{c.Rd}$ = 3320		z	3200	3010	2780	2510	2200	1880	1590	1340	1140	972	838	728	638
457x191x89	4	y	**3670**	**3670**	**3670**	**3670**	**3670**	3640	3610	3590	3560	3530	3490	3460	3420
$N_{c.Rd}$ = 3670		z	3540	3330	3080	2780	2440	2090	1770	1490	1270	1080	934	812	712
457x191x98	4	y	**4120**	**4120**	**4120**	**4120**	4110	4080	4050	4020	3990	3950	3920	3880	3840
$N_{c.Rd}$ = 4120		z	3970	3730	3450	3120	2740	2350	1990	1680	1420	1220	1050	912	799
533x210x82	4	y	**3140**	**3140**	**3140**	**3140**	**3140**	**3140**	3120	3100	3080	3050	3030	3010	2990
$N_{c.Rd}$ = 3140		z	3050	2880	2680	2450	2190	1900	1630	1390	1190	1020	883	769	675
533x210x92	4	y	**3590**	**3590**	**3590**	**3590**	**3590**	**3590**	3570	3550	3520	3500	3470	3450	3420
$N_{c.Rd}$ = 3590		z	3490	3310	3090	2840	2540	2220	1910	1640	1400	1210	1040	911	800
533x210x101	4	y	**4010**	**4010**	**4010**	**4010**	**4010**	**4010**	3990	3960	3930	3910	3880	3850	3820
$N_{c.Rd}$ = 4010		z	3910	3700	3460	3170	2850	2490	2150	1840	1580	1360	1170	1020	901
533x210x109	4	y	**4410**	**4410**	**4410**	**4410**	**4410**	**4410**	4380	4350	4320	4290	4260	4230	4190
$N_{c.Rd}$ = 4410		z	4290	4060	3800	3480	3120	2730	2350	2010	1730	1480	1290	1120	985
533x210x122	4	y	**5050**	**5050**	**5050**	**5050**	**5050**	5040	5010	4980	4940	4910	4870	4840	4800
$N_{c.Rd}$ = 5050		z	4910	4650	4350	3990	3580	3140	2700	2320	1980	1710	1480	1290	1130
610x229x101	4	y	**3800**	**3800**	**3800**	**3800**	**3800**	**3800**	**3800**	3780	3760	3740	3710	3690	3670
$N_{c.Rd}$ = 3800		z	3720	3540	3340	3100	2820	2510	2200	1910	1650	1430	1240	1090	959
610x229x113	4	y	**4340**	**4340**	**4340**	**4340**	**4340**	**4340**	**4340**	4320	4290	4270	4240	4220	4190
$N_{c.Rd}$ = 4340		z	4260	4050	3830	3560	3250	2910	2560	2220	1930	1670	1460	1280	1120
610x229x125	4	y	**4910**	**4910**	**4910**	**4910**	**4910**	**4910**	**4910**	4880	4850	4820	4800	4770	4740
$N_{c.Rd}$ = 4910		z	4820	4590	4330	4040	3690	3310	2910	2540	2200	1910	1660	1460	1290
610x229x140	4	y	**5630**	**5630**	**5630**	**5630**	**5630**	**5630**	**5630**	5590	5560	5530	5500	5460	5430
$N_{c.Rd}$ = 5630		z	5530	5260	4970	4630	4230	3790	3340	2910	2520	2190	1910	1670	1470

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UB SECTIONS SUBJECT TO AXIAL COMPRESSION



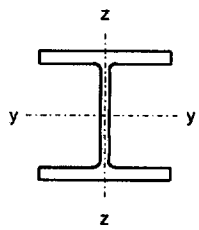
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation	Class	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)												
		Axis	Buckling length in metres											
Cross section resistance (kN)			2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
610x305x149	4	y	**5960**	**5960**	**5960**	5900	5840	5770	5690	5620	5530	5440	5330	5220	5090
$N_{c.Rd}$ = 5960		z	5610	5160	4600	3940	3260	2660	2180	1800	1500	1270	1090	939	819
610x305x179	4	y	**7420**	**7420**	**7420**	7340	7260	7170	7080	6980	6870	6750	6620	6470	6310
$N_{c.Rd}$ = 7420		z	6980	6410	5700	4870	4020	3270	2670	2210	1840	1560	1330	1150	1010
610x305x238	2	y	**10300**	**10300**	**10300**	10100	10000	9910	9780	9640	9490	9320	9140	8930	8710
$N_{c.Rd}$ = 10300		z	9650	8870	7890	6740	5570	4540	3710	3060	2560	2160	1850	1600	1400
686x254x125	4	y	**4680**	**4680**	**4680**	4660	4610	4560	4510	4460	4400	4340	4270	4200	4120
$N_{c.Rd}$ = 4680		z	4210	3680	3000	2330	1800	1400	1110	904	747	626	533	459	399
686x254x140	4	y	**5360**	**5360**	**5360**	5340	5280	5230	5170	5110	5040	4970	4900	4810	4720
$N_{c.Rd}$ = 5360		z	4840	4240	3490	2730	2110	1650	1310	1070	880	739	629	541	471
686x254x152	4	y	**5950**	**5950**	**5950**	5910	5850	5790	5730	5660	5590	5510	5420	5330	5230
$N_{c.Rd}$ = 5950		z	5370	4710	3880	3040	2350	1840	1460	1190	982	824	701	604	525
686x254x170	4	y	**6810**	**6810**	**6810**	6780	6710	6640	6560	6480	6400	6310	6210	6100	5980
$N_{c.Rd}$ = 6810		z	6150	5400	4450	3480	2690	2100	1680	1360	1130	945	804	692	602
762x267x134	4	y	**4830**	**4830**	**4830**	**4830**	4790	4750	4700	4650	4600	4550	4490	4430	4360
$N_{c.Rd}$ = 4830		z	4370	3850	3180	2500	1940	1510	1210	981	811	681	580	499	434
762x267x147	4	y	**5430**	**5430**	**5430**	**5430**	5380	5330	5280	5230	5170	5110	5050	4980	4900
$N_{c.Rd}$ = 5430		z	4920	4340	3600	2830	2200	1720	1370	1120	923	776	660	568	494
762x267x173	4	y	**6650**	**6650**	**6650**	**6650**	6590	6530	6460	6400	6330	6250	6180	6090	6000
$N_{c.Rd}$ = 6650		z	6040	5340	4450	3520	2740	2150	1720	1400	1160	972	827	712	620
762x267x197	4	y	**7780**	**7780**	**7780**	7770	7710	7630	7560	7480	7400	7310	7220	7120	7020
$N_{c.Rd}$ = 7780		z	7080	6270	5250	4170	3260	2560	2050	1660	1380	1160	986	849	739
838x292x176	4	y	**6460**	**6460**	**6460**	**6460**	6430	6380	6330	6270	6210	6150	6090	6020	5950
$N_{c.Rd}$ = 6460		z	5960	5360	4600	3760	2990	2380	1910	1560	1300	1090	931	803	699
838x292x194	4	y	**7270**	**7270**	**7270**	**7270**	7240	7190	7130	7060	7000	6930	6860	6780	6700
$N_{c.Rd}$ = 7270		z	6730	6070	5240	4310	3440	2740	2210	1810	1500	1270	1080	931	811
838x292x226	4	y	**8790**	**8790**	**8790**	**8790**	8760	8690	8610	8540	8460	8380	8290	8200	8110
$N_{c.Rd}$ = 8790		z	8150	7380	6410	5300	4260	3410	2750	2250	1870	1580	1350	1160	1010
914x305x201	4	y	**7340**	**7340**	**7340**	**7340**	**7340**	7280	7230	7170	7110	7050	6980	6920	6850
$N_{c.Rd}$ = 7340		z	6810	6160	5340	4410	3540	2830	2290	1870	1560	1310	1120	966	841
914x305x224	4	y	**8400**	**8400**	**8400**	**8400**	**8400**	8340	8270	8210	8140	8070	8000	7920	7840
$N_{c.Rd}$ = 8400		z	7820	7100	6200	5160	4170	3340	2710	2220	1850	1560	1330	1150	1000
914x305x253	4	y	**9770**	**9770**	**9770**	**9770**	**9770**	9690	9620	9540	9470	9380	9300	9210	9120
$N_{c.Rd}$ = 9770		z	9100	8280	7250	6050	4900	3940	3190	2620	2180	1840	1570	1360	1180
914x305x289	4	y	**11500**	**11500**	**11500**	**11500**	**11500**	11400	11300	11300	11200	11100	11000	10900	10700
$N_{c.Rd}$ = 11500		z	10700	9760	8530	7120	5760	4630	3750	3080	2560	2160	1840	1590	1390
914x419x343	4	y	**14000**	**14000**	**14000**	**14000**	**14000**	13900	13800	13600	13500	13400	13300	13200	13000
$N_{c.Rd}$ = 14000		z	13600	12900	12100	11200	10100	8870	7680	6600	5670	4890	4240	3700	3260
914x419x388	4	y	**16100**	**16100**	**16100**	**16100**	**16100**	16000	15900	15800	15600	15500	15400	15200	15000
$N_{c.Rd}$ = 16100		z	15700	14900	14000	12900	11600	10300	8900	7650	6580	5670	4920	4300	3780

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UC SECTIONS SUBJECT TO AXIAL COMPRESSION



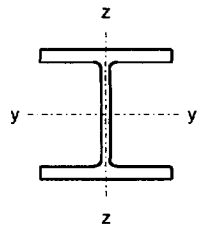
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
152x152x23	3	y	**989**	953	916	874	827	775	716	653	590	529	472	421	377
$N_{c.Rd}$ = 989		z	911	816	712	602	499	411	340	283	239	203	175	152	133
152x152x30	1	y	**1290**	1250	1200	1150	1100	1030	957	879	799	720	646	579	519
$N_{c.Rd}$ = 1290		z	1200	1080	950	812	679	563	468	391	330	282	243	211	185
152x152x37	1	y	**1590**	1540	1490	1420	1350	1280	1190	1090	996	900	809	726	652
$N_{c.Rd}$ = 1590		z	1480	1340	1180	1010	847	704	585	490	414	354	305	265	233
203x203x46	3	y	**1990**	1970	1920	1860	1800	1740	1670	1590	1510	1420	1330	1230	1140
$N_{c.Rd}$ = 1990		z	1930	1800	1660	1520	1360	1200	1050	913	794	692	606	534	472
203x203x52	2	y	**2240**	2220	2170	2100	2040	1970	1890	1800	1710	1610	1510	1400	1300
$N_{c.Rd}$ = 2240		z	2180	2040	1880	1720	1540	1370	1200	1040	907	791	693	611	541
203x203x60	1	y	**2580**	2560	2500	2430	2350	2270	2180	2080	1980	1860	1750	1620	1500
$N_{c.Rd}$ = 2580		z	2510	2350	2170	1980	1780	1580	1380	1210	1050	917	804	708	627
203x203x71	1	y	**3060**	3040	2960	2880	2800	2700	2600	2490	2370	2240	2110	1970	1830
$N_{c.Rd}$ = 3060		z	2980	2790	2590	2370	2140	1900	1670	1460	1280	1120	979	864	766
203x203x86	1	y	**3710**	3690	3600	3500	3400	3290	3170	3040	2890	2740	2580	2410	2240
$N_{c.Rd}$ = 3710		z	3620	3390	3150	2880	2610	2320	2040	1790	1560	1370	1200	1060	941
254x254x73	3	y	**3150**	**3150**	3110	3040	2970	2900	2820	2740	2650	2550	2450	2340	2230
$N_{c.Rd}$ = 3150		z	3140	2980	2820	2640	2460	2270	2070	1870	1680	1510	1350	1210	1080
254x254x89	1	y	**3830**	**3830**	3790	3710	3620	3540	3440	3340	3240	3120	3000	2870	2740
$N_{c.Rd}$ = 3830		z	**3830**	3640	3440	3230	3010	2780	2540	2300	2070	1860	1660	1490	1340
254x254x107	1	y	**4610**	**4610**	4560	4460	4370	4260	4150	4040	3910	3780	3630	3480	3320
$N_{c.Rd}$ = 4610		z	**4610**	4380	4140	3900	3630	3360	3070	2780	2510	2250	2020	1810	1630
254x254x132	1	y	**5680**	**5680**	5630	5520	5400	5270	5140	5000	4860	4700	4520	4340	4150
$N_{c.Rd}$ = 5680		z	**5680**	5410	5130	4830	4510	4170	3830	3480	3140	2830	2540	2280	2050
254x254x167	1	y	**7200**	**7200**	7140	7000	6860	6700	6550	6380	6190	6000	5790	5570	5340
$N_{c.Rd}$ = 7200		z	**7200**	6870	6520	6140	5750	5340	4910	4470	4050	3650	3290	2960	2660

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

UC SECTIONS SUBJECT TO AXIAL COMPRESSION



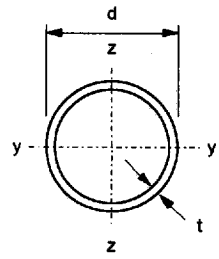
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kN)	Class	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) Buckling length in metres												
			2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
305x305x97	3	y	**4170**	4040	3880	3710	3520	3310	3080	2820	2560	2300	2070	1850	1660
$N_{c.Rd}$ = 4170		z	3880	3490	3080	2630	2200	1830	1520	1270	1070	917	791	688	603
305x305x118	2	y	**5080**	4920	4730	4530	4300	4050	3770	3460	3150	2840	2550	2290	2050
$N_{c.Rd}$ = 5080		z	4720	4270	3760	3230	2710	2250	1870	1570	1330	1130	977	850	746
305x305x137	1	y	**5900**	5710	5500	5270	5020	4730	4400	4050	3690	3340	3000	2690	2420
$N_{c.Rd}$ = 5900		z	5490	4970	4390	3770	3180	2640	2200	1850	1560	1340	1150	1000	880
305x305x158	1	y	**6810**	6610	6370	6100	5810	5480	5120	4720	4310	3900	3510	3160	2840
$N_{c.Rd}$ = 6810		z	6350	5750	5090	4390	3700	3090	2580	2160	1830	1560	1350	1170	1030
305x305x198	1	y	**8530**	8300	8010	7690	7340	6940	6510	6030	5520	5020	4540	4090	3680
$N_{c.Rd}$ = 8530		z	7990	7250	6440	5570	4720	3950	3310	2780	2360	2020	1740	1520	1330
305x305x240	1	y	**10300**	10100	9730	9360	8940	8480	7970	7410	6810	6210	5630	5090	4590
$N_{c.Rd}$ = 10300		z	9700	8820	7860	6830	5800	4880	4090	3440	2920	2500	2160	1880	1650
305x305x283	1	y	**12200**	11900	11500	11100	10600	10100	9500	8860	8180	7480	6810	6170	5580
$N_{c.Rd}$ = 12200		z	11500	10400	9330	8130	6940	5850	4910	4150	3520	3020	2610	2280	2000
356x368x129	3	y	**5560**	5460	5290	5100	4910	4690	4450	4180	3900	3600	3300	3020	2750
$N_{c.Rd}$ = 5560		z	5340	4940	4510	4050	3560	3090	2660	2280	1970	1700	1480	1300	1150
356x368x153	2	y	**6590**	6470	6270	6060	5830	5580	5300	4990	4650	4310	3960	3620	3290
$N_{c.Rd}$ = 6590		z	6330	5860	5360	4820	4250	3690	3180	2730	2350	2040	1770	1560	1370
356x368x177	1	y	**7620**	7500	7270	7030	6760	6470	6150	5800	5420	5020	4620	4220	3850
$N_{c.Rd}$ = 7620		z	7340	6790	6220	5590	4940	4300	3700	3180	2740	2380	2070	1820	1600
356x368x202	1	y	**8700**	8560	8300	8030	7730	7400	7040	6650	6220	5770	5310	4870	4440
$N_{c.Rd}$ = 8700		z	8370	7760	7110	6400	5660	4930	4250	3660	3160	2730	2380	2090	1850
356x406x235	1	y	**10100**	9970	9680	9360	9030	8650	8240	7790	7300	6790	6260	5750	5250
$N_{c.Rd}$ = 10100		z	9830	9160	8450	7690	6880	6070	5300	4600	3990	3480	3050	2680	2370
356x406x287	1	y	**12400**	12200	11800	11500	11100	10600	10100	9600	9020	8400	7770	7150	6550
$N_{c.Rd}$ = 12400		z	12000	11200	10400	9440	8470	7490	6550	5700	4950	4320	3780	3330	2950
356x406x340	1	y	**14600**	14500	14100	13600	13200	12600	12100	11500	10800	10100	9360	8640	7930
$N_{c.Rd}$ = 14600		z	14300	13300	12300	11200	10100	8960	7850	6840	5960	5200	4560	4020	3560
356x406x393	1	y	**16900**	16700	16300	15800	15300	14700	14100	13400	12600	11800	11000	10200	9360
$N_{c.Rd}$ = 16900		z	16500	15400	14300	13100	11800	10500	9180	8020	6990	6110	5360	4730	4190
356x406x467	1	y	**20100**	19900	19400	18800	18200	17600	16900	16100	15200	14300	13400	12400	11400
$N_{c.Rd}$ = 20100		z	19700	18400	17100	15600	14100	12600	11100	9710	8480	7420	6520	5750	5110
356x406x551	1	y	**22400**	22300	21700	21100	20500	19900	19100	18300	17500	16500	15500	14500	13500
$N_{c.Rd}$ = 22400		z	22000	20700	19300	17800	16200	14500	12900	11400	10000	8820	7770	6880	6120
356x406x634	1	y	**25800**	25700	25100	24400	23700	23000	22200	21300	20300	19300	18200	17100	16000
$N_{c.Rd}$ = 25800		z	25400	23800	22300	20600	18800	16900	15100	13400	11800	10400	9150	8110	7220

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

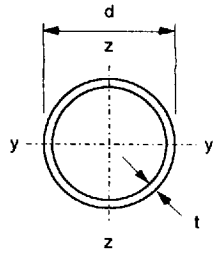
Section Designation		Mass per	Class	Cross Section Resist.	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Outside Diameter d	Thick-ness t	Metre		$N_{c.Rd}$	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
mm	mm	kg/m		kN													
21.3	3.2 Δ	1.43	1	61.5	13.5	6.29	3.60	2.33	1.63	1.20	0.924	0.732	0.594	0.492	0.414	0.353	0.305
26.9	3.2 Δ	1.87	1	80.6	28.4	13.6	7.85	5.10	3.57	2.64	2.03	1.61	1.31	1.08	0.914	0.780	0.673
33.7	2.6 Δ	1.99	1	85.9	46.3	23.7	13.9	9.10	6.40	4.74	3.65	2.90	2.36	1.96	1.65	1.41	1.22
	3.2 Δ	2.41	1	104	54.5	27.7	16.3	10.6	7.47	5.53	4.26	3.38	2.75	2.28	1.92	1.64	1.42
	4.0 Δ	2.93	1	126	64.1	32.4	18.9	12.4	8.69	6.44	4.96	3.94	3.20	2.65	2.23	1.91	1.65
42.4	2.6 Δ	2.55	1	110	78.6	46.4	28.1	18.6	13.1	9.77	7.54	6.00	4.88	4.05	3.42	2.92	2.52
	3.2 Δ	3.09	1	133	94.1	54.9	33.2	21.9	15.5	11.5	8.90	7.07	5.76	4.78	4.03	3.44	2.98
	4.0 Δ	3.79	1	163	113	65.2	39.3	25.9	18.3	13.6	10.5	8.36	6.80	5.64	4.76	4.06	3.51
48.3	3.2	3.56	1	153	120	78.6	49.1	32.7	23.3	17.3	13.4	10.7	8.70	7.22	6.09	5.21	4.50
	4.0	4.37	1	188	146	94.2	58.5	39.0	27.7	20.6	16.0	12.7	10.3	8.59	7.24	6.19	5.35
	5.0	5.34	1	230	176	112	69.0	45.9	32.5	24.2	18.7	14.9	12.1	10.1	8.51	7.27	6.29
60.3	3.2	4.51	1	194	169	133	91.9	63.4	45.7	34.3	26.6	21.3	17.4	14.4	12.2	10.4	9.03
	4.0	5.55	1	239	208	162	111	76.4	54.9	41.2	32.0	25.6	20.9	17.4	14.7	12.5	10.9
	5.0	6.82	1	294	253	195	133	91.1	65.5	49.1	38.1	30.4	24.8	20.6	17.4	14.9	12.9
76.1	3.2	5.75	1	248	228	202	162	121	90.0	68.6	53.8	43.2	35.4	29.5	25.0	21.4	18.5
	4.0	7.11	1	306	282	249	198	147	109	83.3	65.2	52.3	42.9	35.7	30.2	25.9	22.5
	5.0	8.77	1	378	347	305	241	178	132	100	78.5	62.9	51.5	43.0	36.4	31.1	27.0
88.9	3.2	6.76	1	291	275	254	221	178	138	107	84.8	68.5	56.4	47.1	40.0	34.3	29.8
	4.0	8.38	1	361	340	313	272	218	168	131	103	83.5	68.6	57.4	48.7	41.8	36.2
	5.0	10.3	1	446	420	386	333	265	204	158	125	101	83.0	69.4	58.8	50.5	43.8
114.3	3.6	9.83	1	423	410	391	365	328	281	233	191	157	131	110	93.9	80.9	70.4
	5.0	13.5	1	580	562	535	498	446	380	314	256	211	175	148	126	108	94.4
	6.3	16.8	1	723	699	665	618	551	468	384	313	257	214	180	153	132	115
139.7	5.0	16.6	1	715	703	679	650	611	559	495	427	363	309	263	226	196	172
	6.3	20.7	1	893	877	847	809	760	694	613	527	447	379	323	278	241	210
	8.0	26.0	1	1120	1100	1060	1010	948	863	759	650	550	466	397	341	295	258
	10.0	32.0	1	1380	1350	1300	1240	1160	1050	921	785	663	561	477	409	354	309

Δ Sections marked thus are normally available in grade 275 only.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section Resist.	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres											
Outside Diameter d	Thick-ness t	Metre		$N_{c.Rd}$	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
mm	mm	kg/m		kN													
168.3	5.0	20.1	2	867	814	743	633	498	380	293	231	186	153	128	108	93.0	80.7
	6.3	25.2	1	1080	1020	927	786	616	469	362	285	230	189	158	134	115	99.4
	8.0	31.6	1	1360	1270	1160	979	763	580	447	352	283	233	194	165	141	122
	10.0	39.0	1	1680	1570	1430	1200	927	702	540	425	342	281	235	199	170	148
193.7	5.0	23.3	2	1000	957	896	806	681	546	432	346	281	232	194	165	142	123
	6.3	29.1	1	1250	1200	1120	1010	846	677	535	427	347	286	240	204	175	152
	8.0	36.6	1	1580	1500	1410	1260	1050	841	664	530	430	354	297	252	217	188
	10.0	45.3	1	1950	1860	1730	1550	1290	1030	807	643	522	430	360	306	263	228
	12.5	55.9	1	2410	2290	2130	1890	1570	1240	975	776	628	518	434	368	316	274
	16.0 ♦	70.1	1	3020	2870	2660	2350	1930	1520	1190	944	764	629	526	447	383	333
219.1	5.0	26.4	2	1140	1100	1040	968	861	727	596	485	398	331	278	237	204	177
	6.3	33.1	2	1420	1380	1310	1210	1070	905	739	601	493	410	345	293	253	220
	8.0	41.6	1	1790	1730	1640	1520	1340	1130	921	748	613	509	428	364	314	273
	10.0	51.6	1	2220	2140	2030	1880	1650	1380	1130	912	747	620	521	444	382	332
	12.5	63.7	1	2740	2640	2500	2310	2020	1690	1370	1110	905	750	630	536	462	401
	16.0	80.1	1	3450	3320	3140	2880	2510	2080	1680	1360	1110	917	770	655	564	490
	20.0 ♦	98.2	1	4230	4060	3830	3500	3030	2490	2000	1610	1310	1090	913	776	668	580
244.5	6.3	37.0	2	1590	1550	1490	1410	1290	1140	964	803	668	559	473	404	349	304
	8.0	46.7	1	2010	1960	1880	1770	1620	1420	1200	1000	832	696	589	503	434	378
	10.0	57.8	1	2490	2430	2320	2190	2000	1750	1480	1230	1020	851	719	614	530	462
	12.5	71.5	1	3080	3000	2870	2700	2460	2140	1800	1490	1240	1030	873	746	644	560
	16.0	90.2	1	3880	3770	3610	3380	3070	2670	2230	1840	1520	1270	1070	916	790	688
	20.0 ♦	111	1	4770	4630	4420	4140	3740	3220	2680	2210	1820	1520	1280	1090	942	820
	25.0 † ♦	135	1	5830	5650	5380	5020	4510	3860	3190	2610	2150	1790	1510	1290	1110	965
273.0	6.3	41.4	2	1780	1750	1690	1620	1520	1390	1220	1050	892	757	645	554	480	420
	8.0	52.3	2	2250	2210	2130	2040	1910	1740	1530	1320	1120	945	805	692	599	524
	10.0	64.9	1	2790	2740	2650	2520	2360	2150	1890	1620	1370	1160	987	847	734	641
	12.5	80.3	1	3460	3390	3270	3120	2920	2650	2320	1980	1670	1410	1200	1030	894	780
	16.0	101	1	4370	4280	4120	3930	3660	3310	2890	2460	2070	1750	1490	1270	1100	962
	20.0 ♦	125	1	5370	5260	5070	4820	4480	4030	3500	2960	2490	2100	1780	1530	1320	1150
	25.0 ♦	153	1	6590	6440	6190	5880	5450	4870	4200	3540	2970	2490	2120	1810	1570	1370

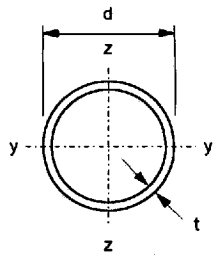
† Sections marked thus are not included in BS4848: Part 2.

♦ Check availabilty of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

CIRCULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Outside Diameter d	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm	mm	kg/m		kN	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
323.9	6.3	49.3	3	2130	2110	2050	1990	1910	1800	1670	1510	1340	1170	1020	890	778	684
	8.0	62.3	2	2680	2660	2590	2510	2400	2270	2100	1900	1680	1470	1280	1110	974	857
	10.0	77.4	1	3330	3310	3220	3110	2980	2820	2600	2350	2080	1810	1570	1370	1200	1050
	12.5	96.0	1	4130	4100	3990	3850	3690	3480	3210	2890	2550	2220	1930	1680	1470	1290
	16.0	121	1	5230	5190	5040	4870	4660	4380	4040	3630	3190	2770	2400	2090	1820	1600
	20.0 ♦	150	1	6460	6390	6210	5990	5730	5380	4940	4420	3870	3360	2910	2520	2200	1930
	25.0 ♦	184	1	7940	7850	7620	7350	7010	6570	6010	5350	4670	4040	3490	3020	2630	2310
355.6	8.0	68.6	2	2950	**2950**	2870	2790	2700	2580	2440	2260	2050	1830	1620	1430	1260	1110
	10.0	85.2	2	3670	3660	3570	3470	3350	3210	3020	2800	2540	2260	2000	1760	1550	1370
	12.5	106	1	4560	4540	4430	4300	4150	3970	3740	3450	3130	2780	2450	2160	1900	1680
	16.0	134	1	5770	5750	5610	5440	5250	5010	4710	4340	3920	3480	3070	2690	2370	2090
	20.0 ♦	166	1	7130	7100	6920	6710	6470	6170	5790	5320	4790	4240	3730	3270	2870	2530
	25.0 ♦	204	1	8780	8730	8510	8250	7950	7560	7080	6480	5810	5130	4500	3940	3460	3050
406.4	10.0	97.8	2	4210	**4210**	4140	4040	3930	3810	3660	3470	3250	3000	2720	2450	2200	1960
	12.5	121	1	5230	**5230**	5130	5020	4880	4720	4530	4300	4020	3700	3360	3020	2700	2420
	16.0	154	1	6630	**6630**	6510	6360	6190	5980	5730	5430	5070	4660	4220	3790	3390	3020
	20.0 ♦	191	1	8210	**8210**	8050	7860	7640	7380	7070	6690	6230	5710	5160	4630	4130	3680
	25.0 ♦	235	1	10100	**10100**	9920	9680	9410	9080	8690	8200	7620	6960	6280	5610	5000	4460
	32.0 ♦	295	1	12700	**12700**	12500	12100	11800	11400	10800	10200	9450	8600	7730	6890	6130	5450
457.0	10.0	110	2	4750	**4750**	4700	4610	4510	4390	4260	4110	3920	3700	3450	3180	2910	2640
	12.5	137	2	5900	**5900**	5840	5720	5600	5460	5290	5090	4860	4580	4270	3930	3590	3260
	16.0	174	1	7490	**7490**	7410	7260	7100	6920	6710	6450	6150	5790	5390	4950	4520	4090
	20.0 ♦	216	1	9280	**9280**	9170	8990	8790	8560	8290	7970	7580	7130	6620	6080	5530	5010
	25.0 ♦	266	1	11500	**11500**	11300	11100	10800	10600	10200	9810	9320	8750	8100	7420	6740	6100
	32.0 ♦	335	1	14400	**14400**	14300	14000	13600	13300	12800	12300	11600	10900	10100	9190	8320	7510
	40.0 ♦	411	1	17700	**17700**	17500	17100	16700	16200	15600	15000	14100	13200	12100	11000	9980	8980
508.0	10.0	123	3	5290	**5290**	5260	5170	5080	4970	4860	4720	4560	4370	4160	3910	3650	3370
	12.5	153	2	6580	**6580**	6540	6430	6310	6180	6030	5860	5660	5430	5150	4840	4510	4170
	16.0	194	1	8360	**8360**	8310	8170	8020	7850	7660	7440	7180	6870	6520	6120	5700	5260
	20.0 ♦	241	1	10400	**10400**	10300	10100	9930	9720	9480	9200	8870	8490	8040	7540	7010	6460
	25.0 ♦	298	1	12800	**12800**	12700	12500	12300	12000	11700	11400	10900	10500	9890	9260	8580	7900
	32.0 ♦	376	1	16200	**16200**	16100	15800	15500	15100	14700	14300	13700	13100	12400	11500	10700	9800
	40.0 ♦	462	1	19900	**19900**	19700	19400	19000	18500	18000	17500	16800	16000	15000	14000	12900	11800
	50.0 ♦	565	1	23000	**23000**	22800	22400	21900	21400	20900	20200	19400	18500	17500	16300	15000	13800

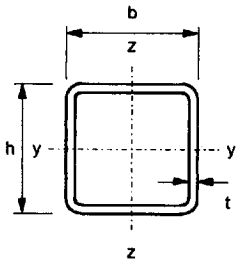
♦ Check availabilty of sections.

Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance.)

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



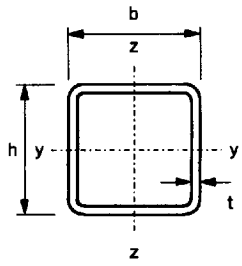
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm.mm	mm	kg/m		kN	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
20x20	2.0	1.12	1	48.0	13.1	6.15	3.53	2.29	1.60	1.18	0.910	0.721	0.586	0.485	0.408	0.348	0.301
	2.5	1.35	1	58.1	15.0	7.02	4.03	2.61	1.83	1.35	1.04	0.822	0.668	0.553	0.465	0.397	0.343
25x25	2.0	1.43	1	61.6	25.7	12.5	7.28	4.74	3.33	2.46	1.89	1.50	1.22	1.01	0.852	0.727	0.628
	2.5	1.74	1	75.1	30.2	14.6	8.49	5.52	3.87	2.87	2.21	1.75	1.42	1.18	0.992	0.847	0.731
	3.0	2.04	1	87.8	33.9	16.4	9.48	6.16	4.32	3.20	2.46	1.95	1.59	1.31	1.11	0.944	0.815
	3.2	2.15	1	92.7	35.2	17.0	9.82	6.38	4.48	3.31	2.55	2.02	1.64	1.36	1.15	0.977	0.844
30x30	2.5	2.14	1	92.0	50.5	26.0	15.3	9.99	7.03	5.21	4.01	3.19	2.59	2.15	1.81	1.55	1.34
	3.0	2.51	1	108	57.7	29.5	17.3	11.3	7.95	5.89	4.54	3.60	2.93	2.43	2.05	1.75	1.51
	3.2	2.65	1	114	60.3	30.7	18.0	11.8	8.28	6.14	4.73	3.75	3.05	2.53	2.13	1.82	1.57
40x40	2.5	2.92	1	126	95.8	60.2	37.1	24.7	17.5	13.0	10.1	8.01	6.52	5.42	4.57	3.90	3.38
	3.0	3.45	1	149	112	69.6	42.7	28.4	20.1	15.0	11.6	9.21	7.50	6.23	5.25	4.49	3.88
	3.2	3.66	1	158	118	73.1	44.8	29.8	21.1	15.7	12.1	9.65	7.86	6.53	5.50	4.70	4.07
	4.0	4.46	1	192	142	85.9	52.4	34.7	24.6	18.3	14.1	11.2	9.16	7.60	6.41	5.48	4.73
	5.0	5.40	1	233	167	99.0	60.1	39.7	28.1	20.9	16.1	12.8	10.4	8.67	7.31	6.25	5.40
50x50	2.5	3.71	1	160	137	105	70.5	48.2	34.6	26.0	20.1	16.1	13.1	10.9	9.21	7.88	6.82
	3.0	4.39	1	189	162	123	82.1	56.1	40.2	30.1	23.4	18.7	15.2	12.7	10.7	9.14	7.91
	3.2	4.66	1	201	171	129	86.5	59.1	42.4	31.7	24.6	19.6	16.0	13.3	11.2	9.62	8.32
	4.0	5.72	1	246	209	155	103	70.1	50.2	37.6	29.1	23.2	19.0	15.8	13.3	11.4	9.84
	5.0	6.97	1	300	252	184	121	81.9	58.6	43.8	34.0	27.1	22.1	18.4	15.5	13.3	11.5
	6.3	8.49	1	366	303	216	140	94.2	67.3	50.3	39.0	31.0	25.3	21.0	17.8	15.2	13.1
60x60	3.0	5.34	1	230	208	177	133	95.0	69.5	52.5	41.0	32.8	26.8	22.3	18.9	16.2	14.0
	3.2	5.67	1	244	220	187	140	100	73.3	55.4	43.2	34.6	28.3	23.6	19.9	17.1	14.8
	4.0	6.97	1	300	270	228	169	120	87.8	66.3	51.7	41.4	33.8	28.2	23.8	20.4	17.7
	5.0	8.54	1	368	329	275	202	143	104	78.4	61.1	48.9	40.0	33.3	28.1	24.1	20.8
	6.3	10.5	1	451	401	331	239	168	122	91.7	71.4	57.1	46.6	38.8	32.8	28.1	24.3
	8.0	12.8	1	552	487	393	278	194	140	105	81.8	65.4	53.4	44.4	37.5	32.1	27.8
70x70	3.0	6.28	1	270	252	227	188	144	108	82.9	65.1	52.4	43.0	35.9	30.4	26.0	22.6
	3.6	7.46	1	321	298	268	221	168	126	96.8	76.0	61.1	50.1	41.8	35.4	30.4	26.3
	5.0	10.1	1	435	403	360	293	221	165	126	98.9	79.5	65.2	54.3	46.0	39.4	34.2
	6.3	12.5	1	536	495	439	353	263	196	149	117	94.0	77.0	64.2	54.4	46.6	40.4
	8.0	15.3	1	660	606	533	421	310	230	175	137	110	89.8	74.8	63.3	54.2	47.0
80x80	3.0	7.22	1	311	295	274	241	198	155	121	96.3	77.9	64.2	53.7	45.6	39.1	33.9
	3.6	8.59	1	370	350	325	285	233	182	142	113	91.3	75.2	62.9	53.4	45.8	39.8
	5.0	11.7	1	503	475	439	383	310	241	187	148	120	98.6	82.5	69.9	60.0	52.1
	6.3	14.4	1	621	586	539	467	374	289	224	177	143	118	98.4	83.4	71.6	62.1
	8.0	17.8	1	769	722	661	566	448	343	266	210	169	139	116	98.4	84.4	73.2
90x90	3.6	9.72	1	419	402	379	346	299	245	197	158	129	107	89.6	76.2	65.5	56.9
	5.0	13.3	1	571	547	515	468	402	327	261	210	171	141	118	101	86.5	75.1
	6.3	16.4	1	707	676	635	575	490	396	315	252	205	170	142	121	104	90.2
	8.0	20.4	1	877	837	784	705	595	477	377	302	245	202	169	144	124	107

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

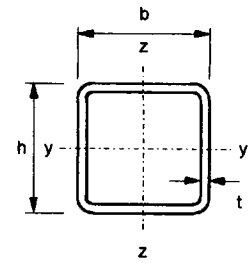
Section Designation		Mass per Metre	Class	Cross Section Resist.	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size h x b	Thick-ness t			$N_{c.Rd}$													
mm.mm	mm	kg/m		kN	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
100x100	4.0	12.0	1	517	445	343	232	159	114	85.8	66.6	53.2	43.4	36.1	30.5	26.1	22.6
	5.0	14.8	1	638	548	418	282	193	139	104	80.6	64.3	52.5	43.6	36.8	31.5	27.3
	6.3	18.4	1	792	676	511	342	233	167	125	97.2	77.6	63.3	52.6	44.4	38.0	32.9
	8.0	22.9	1	985	835	621	412	280	201	150	117	92.9	75.8	63.0	53.2	45.5	39.4
	10.0	27.9	1	1200	1010	737	483	328	234	175	136	108	88.3	73.4	62.0	53.0	45.9
120x120	4.0	14.5	2	625	567	486	370	266	195	148	115	92.4	75.6	62.9	53.2	45.6	39.5
	5.0	18.0	1	774	700	598	452	325	238	180	140	112	91.9	76.6	64.7	55.4	48.0
	6.3	22.3	1	962	869	738	554	396	290	219	171	137	112	93.1	78.7	67.4	58.4
	8.0	27.9	1	1200	1080	912	677	482	351	265	207	166	135	113	95.3	81.6	70.6
	10.0	34.2	1	1470	1320	1100	807	571	416	314	244	195	160	133	112	96.3	83.3
	12.5	41.6	1	1790	1590	1320	950	668	484	365	284	227	186	154	131	112	96.7
140x140	5.0 †	21.1	1	909	847	765	636	488	368	282	222	179	147	122	104	88.8	77.0
	6.3 †	26.3	1	1130	1050	949	785	600	451	346	272	218	179	150	127	109	94.1
	8.0 †	32.9	1	1420	1320	1180	969	736	552	423	332	267	219	182	154	132	115
	10.0 †	40.4	1	1740	1610	1440	1170	883	660	504	396	318	261	217	184	158	137
	12.5 †	49.5	1	2130	1970	1740	1400	1050	779	594	466	374	306	256	216	185	161
150x150	5.0	22.7	2	976	919	844	726	577	444	344	272	219	180	151	128	110	95.0
	6.3	28.3	1	1220	1140	1050	899	711	546	422	333	269	221	184	156	134	116
	8.0	35.4	1	1530	1430	1310	1110	877	670	518	408	329	270	226	191	164	142
	10.0	43.6	1	1880	1760	1600	1350	1060	805	620	489	394	323	270	229	196	170
	12.5	53.4	1	2300	2150	1950	1630	1260	955	735	578	465	382	319	270	232	201
	16.0	66.4	1	2860	2660	2390	1980	1510	1130	870	683	549	451	376	318	273	237
160x160	5.0 †	24.2	2	1040	991	921	813	669	526	412	327	265	218	183	155	133	115
	6.0 †	28.9	1	1240	1180	1090	965	791	620	485	385	312	257	215	182	156	136
	6.3 †	30.3	1	1300	1240	1150	1010	827	648	507	402	325	268	224	190	163	142
	8.0 †	37.9	1	1630	1550	1430	1260	1020	798	623	494	399	329	275	233	200	174
	10.0 †	46.7	1	2010	1900	1760	1530	1240	962	749	593	479	395	330	280	240	208
	12.5 †	57.3	1	2470	2330	2140	1860	1490	1150	891	705	569	468	391	332	285	247
180x180	5.0 †	27.4	3	1180	1130	1070	980	852	703	566	456	372	308	259	220	189	165
	6.3	34.2	1	1470	1420	1340	1220	1060	869	698	562	459	380	319	271	233	203
	8.0	43.0	1	1850	1780	1670	1530	1320	1080	863	694	566	468	393	334	287	249
	10.0	53.0	1	2280	2190	2060	1870	1610	1310	1040	839	683	564	473	402	346	301
	12.5	65.2	1	2810	2690	2520	2280	1950	1570	1250	1000	816	674	565	480	413	359
	16.0	81.4	1	3510	3350	3140	2820	2380	1910	1510	1210	980	809	678	575	494	429
200x200	5.0 †	30.5	4	1200	1170	1120	1050	962	845	714	593	493	412	348	298	257	224
	6.3	38.2	2	1640	1590	1520	1420	1280	1100	914	750	618	515	434	370	319	278
	8.0	48.0	1	2070	2000	1910	1780	1600	1370	1130	929	765	637	537	458	395	343
	10.0	59.3	1	2550	2470	2350	2190	1960	1670	1380	1130	928	772	650	554	477	415
	12.5	73.0	1	3140	3040	2890	2690	2390	2030	1670	1360	1120	927	781	665	573	498
	16.0	91.5	1	3940	3800	3610	3340	2960	2490	2030	1650	1350	1120	943	803	691	601
250x250	6.3	48.1	4	1890	1870	1820	1750	1660	1550	1410	1250	1090	935	805	696	606	531
	8.0	60.5	2	2610	2570	2490	2380	2250	2080	1860	1620	1390	1190	1020	877	761	666
	10.0	75.0	1	3230	3180	3080	2950	2780	2560	2290	1990	1700	1450	1240	1070	928	812
	12.5	92.6	1	3990	3930	3790	3630	3430	3150	2800	2430	2070	1760	1510	1300	1120	983
	16.0	117	1	5020	4940	4770	4560	4290	3920	3480	3000	2550	2160	1850	1590	1380	1200

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

SQUARE HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN) for buckling length in metres												
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$													
mm.mm	mm	kg/m		kN	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
300x300	6.3 †	57.9	4	2020	**2020**	1970	1920	1870	1800	1720	1620	1500	1370	1230	1100	976	868
	8.0	73.1	4	2980	2970	2900	2820	2720	2610	2460	2270	2060	1840	1630	1430	1260	1110
	10.0	90.7	2	3910	3890	3790	3680	3540	3370	3160	2900	2610	2310	2030	1780	1560	1380
	12.5	112	1	4830	4810	4690	4540	4380	4160	3900	3570	3200	2830	2480	2170	1900	1680
	16.0	142	1	6100	6070	5910	5730	5510	5230	4880	4460	3980	3510	3070	2680	2350	2070
350x350	8.0	85.7	4	3160	**3160**	3120	3060	2990	2900	2810	2690	2550	2390	2200	2010	1820	1640
	10.0	106	3	4580	**4580**	4500	4390	4270	4130	3970	3760	3510	3230	2930	2630	2350	2100
	12.5	132	1	5680	**5680**	5570	5440	5290	5120	4900	4640	4330	3970	3600	3230	2880	2570
	16.0	167	1	7190	**7190**	7040	6870	6680	6460	6180	5840	5430	4970	4490	4020	3590	3200
400x400	10.0	122	4	4790	**4790**	4750	4660	4570	4470	4350	4210	4040	3850	3630	3380	3120	2860
	12.5	152	2	6530	**6530**	6460	6330	6190	6040	5860	5640	5390	5080	4740	4370	3990	3630
	16.0	192	1	8270	**8270**	8170	8010	7840	7640	7400	7130	6790	6400	5960	5480	5000	4540
	20.0	237	1	10200	**10200**	10100	9890	9670	9420	9120	8770	8350	7850	7290	6690	6090	5520

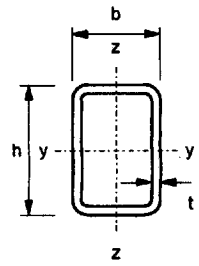
† Sections marked thus are not included in BS4848: Part 2.

Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
50x25	2.5	2.72	1	117	y	96.7	68.1	43.9	29.6	21.1	15.8	12.2	9.73	7.93	6.59	5.56	4.76	4.11
					z	54.3	26.9	15.6	10.2	7.16	5.30	4.08	3.24	2.63	2.18	1.84	1.57	1.36
	3.0	3.22	1	139	y	113	79.0	50.6	34.1	24.3	18.1	14.0	11.2	9.12	7.58	6.39	5.47	4.73
					z	61.9	30.5	17.7	11.5	8.11	6.00	4.62	3.67	2.98	2.47	2.08	1.78	1.53
	3.2	3.41	1	147	y	120	83.1	53.1	35.7	25.5	19.0	14.7	11.7	9.56	7.94	6.70	5.73	4.96
					z	64.7	31.8	18.5	12.0	8.45	6.25	4.81	3.82	3.10	2.57	2.17	1.85	1.60
50x30	2.5	2.92	1	126	y	105	75.7	49.3	33.3	23.8	17.8	13.8	11.0	8.97	7.45	6.29	5.38	4.65
					z	75.2	39.9	23.6	15.5	10.9	8.08	6.23	4.95	4.03	3.34	2.81	2.40	2.08
	3.0	3.45	1	149	y	123	88.0	57.0	38.5	27.5	20.5	15.9	12.7	10.3	8.59	7.25	6.20	5.37
					z	86.9	45.7	27.0	17.7	12.4	9.23	7.11	5.65	4.60	3.81	3.21	2.74	2.37
	3.2	3.66	1	158	y	130	92.7	59.9	40.4	28.9	21.6	16.7	13.3	10.9	9.02	7.61	6.51	5.63
					z	91.3	47.8	28.2	18.5	13.0	9.65	7.43	5.90	4.80	3.98	3.36	2.87	2.48
	4.0	4.46	1	192	y	157	110	70.5	47.4	33.8	25.3	19.6	15.6	12.7	10.6	8.91	7.62	6.59
					z	107	55.3	32.5	21.3	15.0	11.1	8.55	6.79	5.52	4.58	3.86	3.30	2.85
	5.0	5.40	1	233	y	188	128	81.4	54.6	38.9	29.0	22.5	17.9	14.6	12.1	10.2	8.74	7.56
					z	123	62.5	36.6	23.9	16.8	12.5	9.61	7.63	6.20	5.14	4.33	3.70	3.20
60x40	2.5	3.71	1	160	y	143	119	86.4	61.0	44.3	33.4	26.0	20.8	17.0	14.2	12.0	10.2	8.87
					z	126	82.4	51.5	34.4	24.5	18.2	14.1	11.2	9.15	7.60	6.41	5.48	4.74
	3.0	4.39	1	189	y	169	139	101	71.1	51.6	38.9	30.3	24.2	19.8	16.5	13.9	11.9	10.3
					z	148	95.9	59.7	39.8	28.3	21.1	16.3	13.0	10.6	8.78	7.40	6.33	5.47
	3.2	4.66	1	201	y	179	148	107	74.9	54.4	41.0	31.9	25.5	20.8	17.3	14.7	12.5	10.9
					z	156	101	62.8	41.9	29.7	22.1	17.1	13.6	11.1	9.22	7.78	6.65	5.75
	4.0	5.72	1	246	y	218	178	128	89.3	64.7	48.7	37.9	30.3	24.7	20.6	17.4	14.9	12.9
					z	189	120	74.0	49.3	34.9	26.0	20.1	16.0	13.0	10.8	9.14	7.81	6.75
	5.0	6.97	1	300	y	265	214	151	105	75.8	57.0	44.4	35.4	29.0	24.1	20.3	17.4	15.1
					z	226	140	85.9	57.0	40.4	30.1	23.2	18.5	15.1	12.5	10.5	9.01	7.79
	6.3	8.49	1	366	y	320	253	176	122	87.7	65.9	51.2	40.9	33.4	27.8	23.4	20.1	17.4
					z	267	161	97.8	64.8	45.8	34.1	26.3	21.0	17.1	14.2	11.9	10.2	8.82
80x40	3.0	5.34	1	230	y	215	196	166	129	98.3	75.8	59.7	48.1	39.5	33.0	27.9	24.0	20.8
					z	183	122	76.6	51.2	36.4	27.2	21.0	16.7	13.6	11.3	9.56	8.17	7.06
	3.2	5.67	1	244	y	228	208	175	137	104	80.0	63.0	50.8	41.7	34.8	29.5	25.3	21.9
					z	194	128	80.6	53.9	38.3	28.6	22.1	17.6	14.3	11.9	10.1	8.59	7.43
	4.0	6.97	1	300	y	281	254	213	165	125	96.2	75.7	60.9	50.0	41.8	35.4	30.3	26.3
					z	235	153	95.6	63.8	45.3	33.8	26.1	20.8	16.9	14.1	11.9	10.1	8.77
	5.0	8.54	1	368	y	343	309	257	198	149	114	89.9	72.3	59.3	49.5	41.9	36.0	31.2
					z	283	180	112	74.3	52.7	39.3	30.3	24.2	19.7	16.3	13.8	11.8	10.2
	6.3	10.5	1	451	y	419	376	309	234	176	135	106	85.0	69.7	58.1	49.2	42.2	36.6
					z	338	209	128	85.1	60.3	44.9	34.7	27.6	22.5	18.7	15.7	13.5	11.6
	8.0	12.8	1	552	y	510	454	366	274	204	156	122	98.1	80.4	67.0	56.7	48.6	42.1
					z	398	237	144	95.1	67.3	50.0	38.6	30.7	25.0	20.8	17.5	15.0	12.9

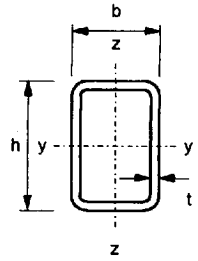
y - y is the major axis and z - z is the minor axis.

Classification is for buckling about either y - y axis or z - z axis.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



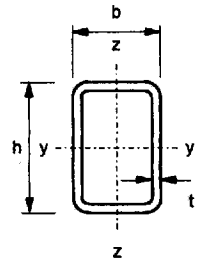
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Axis	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)												
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$		Buckling length in metres												
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
90x50	3.0	6.28	2	270	y	258	241	215	180	143	113	89.9	72.9	60.1	50.4	42.8	36.7	31.9
					z	237	188	131	90.9	65.5	49.2	38.3	30.6	25.0	20.8	17.5	15.0	13.0
	3.6	7.46	1	321	y	306	285	254	212	168	132	105	85.3	70.3	58.9	50.0	42.9	37.3
					z	280	221	153	106	76.1	57.1	44.4	35.5	28.9	24.1	20.3	17.4	15.1
	5.0	10.1	1	435	y	413	385	340	281	221	173	138	112	91.9	76.9	65.3	56.0	48.6
					z	376	291	198	136	97.7	73.3	56.9	45.4	37.1	30.8	26.0	22.3	19.3
	6.3	12.5	1	536	y	508	471	414	338	265	207	164	133	109	91.4	77.5	66.5	57.7
					z	459	347	233	159	114	85.5	66.3	52.9	43.2	35.9	30.3	25.9	22.4
	8.0	15.3	1	660	y	624	575	501	404	313	244	193	156	128	107	90.8	78.0	67.6
					z	557	409	269	183	131	97.9	75.9	60.5	49.4	41.0	34.6	29.6	25.6
100x50	3.0	6.75	2	291	y	280	264	242	211	175	141	114	92.7	76.8	64.5	54.9	47.2	41.0
					z	255	204	143	99.5	71.9	54.0	42.0	33.5	27.4	22.8	19.2	16.5	14.3
	3.2	7.18	2	309	y	297	281	257	224	185	149	120	98.2	81.3	68.3	58.1	50.0	43.4
					z	271	217	151	105	75.8	57.0	44.3	35.4	28.9	24.0	20.3	17.4	15.0
	4.0	8.86	1	381	y	366	346	316	274	225	181	146	119	98.5	82.7	70.3	60.5	52.5
					z	333	263	182	126	90.8	68.2	53.0	42.3	34.5	28.7	24.3	20.8	18.0
	5.0	10.9	1	469	y	450	424	387	333	273	218	175	143	118	99.3	84.4	72.6	63.0
					z	407	317	217	149	107	80.6	62.6	50.0	40.8	33.9	28.6	24.5	21.2
	6.3	13.4	1	579	y	554	521	473	405	328	262	210	171	141	118	101	86.6	75.2
					z	497	380	256	175	126	94.3	73.2	58.4	47.7	39.6	33.5	28.6	24.8
	8.0	16.6	1	714	y	683	640	577	488	392	311	249	202	167	140	119	102	88.7
					z	605	449	297	202	145	108	84.0	67.0	54.7	45.4	38.4	32.8	28.4
100x60	3.0	7.22	2	311	y	300	284	262	231	193	157	127	104	86.2	72.4	61.7	53.1	46.1
					z	284	248	194	142	105	79.7	62.3	49.9	40.9	34.1	28.8	24.7	21.4
	3.6	8.59	1	370	y	356	338	311	273	227	184	149	122	101	85.0	72.3	62.3	54.1
					z	338	294	228	166	123	93.0	72.7	58.3	47.7	39.7	33.6	28.8	24.9
	5.0	11.7	1	503	y	484	457	420	366	303	244	197	161	133	112	95.3	82.0	71.2
					z	457	394	301	217	160	121	94.4	75.6	61.9	51.6	43.6	37.3	32.3
	6.3	14.4	1	621	y	597	563	515	446	366	294	237	193	160	134	114	98.1	85.3
					z	562	479	361	259	189	143	112	89.4	73.1	60.9	51.5	44.1	38.2
	8.0	17.8	1	769	y	737	693	630	540	440	351	282	229	190	159	135	116	101
					z	690	579	428	304	221	167	130	104	85.1	70.9	59.9	51.3	44.4
120x60	3.6	9.72	2	419	y	409	392	371	342	304	260	218	182	153	129	111	95.6	83.3
					z	383	336	264	194	143	109	85.2	68.3	55.9	46.6	39.4	33.8	29.3
	5.0	13.3	1	571	y	557	534	504	463	409	348	291	242	203	172	147	127	110
					z	520	452	350	254	187	142	111	89.0	72.8	60.7	51.3	44.0	38.1
	6.3	16.4	1	707	y	689	660	622	569	500	424	352	293	245	207	177	153	133
					z	642	552	421	304	223	169	132	105	86.3	71.9	60.8	52.1	45.1
	8.0	20.4	1	877	y	853	816	767	699	610	513	425	352	294	248	212	183	159
					z	791	671	501	358	262	198	154	123	101	84.1	71.1	60.9	52.7

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



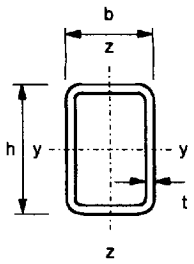
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
120x80	5.0	14.8	1	638	y	625	601	570	529	474	410	346	290	244	207	177	153	134
					z	607	565	503	417	330	259	206	167	138	115	97.8	84.0	72.9
	6.3	18.4	1	792	y	774	744	705	652	582	500	421	352	296	251	215	186	162
					z	751	698	617	507	399	312	248	201	165	138	117	101	87.5
	8.0	22.9	1	985	y	962	923	873	804	714	610	510	426	357	302	259	223	195
					z	932	863	756	614	479	374	296	239	197	165	140	120	104
	10.0	27.9	1	1200	y	1170	1120	1060	970	854	724	603	501	420	355	303	262	228
					z	1130	1040	903	724	559	434	344	277	228	191	162	139	120
150x100	5.0	18.7	2	807	y	801	779	754	723	684	633	573	507	443	385	336	293	258
					z	785	751	705	641	557	467	386	320	267	225	192	166	144
	6.3	23.3	1	1000	y	997	969	937	898	847	783	706	624	544	472	411	359	315
					z	976	932	873	791	684	571	471	389	324	274	233	201	175
	8.0	29.1	1	1260	y	1240	1210	1170	1120	1050	970	871	766	666	577	502	438	385
					z	1220	1160	1080	977	839	696	571	471	392	331	282	243	212
	10.0	35.7	1	1540	y	1520	1480	1430	1360	1280	1180	1050	920	797	689	598	521	458
					z	1490	1420	1320	1180	1010	828	677	556	463	390	332	286	249
	12.5	43.6	1	1880	y	1860	1800	1740	1650	1550	1410	1250	1090	942	812	703	613	537
					z	1810	1720	1590	1410	1190	970	788	646	537	452	384	331	288
160x80	5.0	18.0	2	774	y	769	748	725	697	661	616	561	500	440	384	335	294	259
					z	738	691	620	522	418	330	264	214	177	148	126	108	93.7
	6.3	22.3	1	962	y	956	930	901	865	819	762	692	615	539	470	410	359	316
					z	916	856	764	638	507	400	318	258	213	178	151	130	113
	8.0	27.9	1	1200	y	1190	1160	1120	1080	1020	943	853	756	661	575	500	438	385
					z	1140	1060	941	777	613	481	382	309	255	213	181	156	135
	10.0	34.2	1	1470	y	1460	1420	1370	1310	1240	1140	1030	907	790	686	596	521	457
					z	1390	1290	1130	923	721	563	446	361	297	248	211	181	157
	12.5	41.6	1	1790	y	1770	1720	1660	1590	1490	1370	1230	1080	932	807	700	610	536
					z	1690	1550	1350	1080	832	646	511	412	339	283	240	206	179
200x100	5.0	22.7	4	917	y	**917**	905	886	865	840	811	777	735	687	633	577	521	470
					z	896	861	815	752	669	573	481	402	337	286	245	211	184
	6.3	28.3	2	1220	y	**1220**	1200	1170	1140	1110	1070	1010	954	883	807	730	656	588
					z	1190	1140	1070	976	854	721	598	496	415	350	299	258	225
	8.0	35.4	1	1530	y	**1530**	1500	1470	1430	1380	1330	1260	1190	1100	999	902	809	724
					z	1480	1420	1330	1210	1050	883	729	603	504	425	363	313	273
	10.0	43.6	1	1880	y	**1880**	1840	1800	1750	1700	1630	1550	1450	1330	1210	1090	976	873
					z	1820	1740	1630	1470	1270	1060	868	716	597	504	430	370	322
	12.5	53.4	1	2300	y	**2300**	2250	2200	2140	2070	1980	1880	1750	1610	1460	1310	1170	1040
					z	2230	2120	1980	1770	1510	1250	1020	838	697	587	501	431	375
	16.0	66.4	1	2860	y	**2860**	2800	2730	2650	2560	2450	2310	2140	1950	1760	1570	1400	1240
					z	2760	2620	2420	2140	1800	1460	1190	974	808	680	579	498	433

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



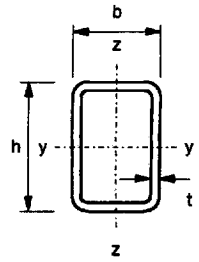
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
200x120	5.0 †	24.2	4	985	y	**985**	973	953	931	906	877	842	800	750	695	636	578	522
					z	973	943	907	862	803	728	642	555	477	410	355	308	270
	6.0 †	28.9	2	1240	y	**1240**	1230	1200	1170	1140	1100	1050	990	923	848	771	696	627
					z	1230	1190	1140	1080	994	891	776	666	568	487	420	364	319
	6.3 †	30.3	2	1300	y	**1300**	1280	1260	1230	1190	1150	1100	1040	966	887	806	728	655
					z	1280	1240	1190	1130	1040	931	811	695	593	508	438	380	332
	8.0 †	37.9	1	1630	y	**1630**	1610	1570	1530	1490	1440	1370	1290	1200	1100	998	900	808
					z	1610	1560	1490	1400	1290	1150	999	853	727	621	535	464	406
	10.0 †	46.7	1	2010	y	**2010**	1980	1940	1890	1830	1760	1680	1580	1460	1340	1210	1090	977
					z	1980	1910	1830	1720	1570	1400	1200	1020	870	742	638	553	484
	12.5 †	57.3	1	2470	y	**2470**	2430	2370	2310	2240	2150	2040	1920	1770	1610	1460	1310	1170
					z	2420	2340	2230	2090	1900	1670	1430	1210	1030	876	752	652	569
200x150	5.0 †	26.6	4	1090	y	**1090**	1070	1050	1030	1000	974	938	894	844	786	724	661	600
					z	1080	1060	1030	997	957	906	844	771	693	615	544	480	426
	6.3 †	33.2	2	1430	y	**1430**	1410	1380	1350	1310	1270	1220	1160	1090	1000	919	833	753
					z	**1430**	1390	1350	1300	1250	1170	1090	983	875	772	679	597	528
	8.0 †	41.7	1	1800	y	**1800**	1770	1740	1690	1650	1590	1530	1450	1350	1250	1140	1030	932
					z	1790	1740	1690	1630	1560	1470	1350	1220	1080	953	836	736	649
	10.0 †	51.4	1	2220	y	**2220**	2180	2140	2090	2030	1960	1870	1770	1650	1520	1390	1250	1130
					z	2200	2150	2080	2010	1910	1790	1650	1480	1310	1150	1010	886	781
	12.5 †	63.2	1	2720	y	**2720**	2680	2620	2560	2480	2400	2290	2160	2010	1840	1670	1510	1360
					z	2710	2640	2560	2460	2340	2180	2000	1790	1570	1380	1200	1060	930
	16.0 †	78.9	1	3400	y	**3400**	3340	3270	3190	3090	2970	2830	2660	2470	2250	2040	1830	1640
					z	3380	3280	3180	3050	2890	2690	2440	2170	1900	1650	1440	1260	1110
250x100	6.3 †	33.2	4	1340	y	**1340**	**1340**	1320	1290	1270	1240	1210	1170	1120	1070	1010	948	881
					z	1310	1260	1200	1110	986	847	712	595	500	424	363	314	274
	8.0 †	41.7	2	1800	y	**1800**	1790	1760	1720	1690	1640	1600	1540	1470	1400	1310	1220	1120
					z	1750	1680	1580	1440	1260	1070	886	735	615	520	444	383	334
	10.0 †	51.4	1	2220	y	**2220**	2200	2160	2120	2080	2020	1960	1890	1810	1710	1600	1490	1370
					z	2150	2060	1930	1760	1530	1280	1060	876	731	617	527	455	396
	12.5 †	63.2	1	2720	y	**2720**	2700	2650	2600	2540	2480	2400	2310	2210	2080	1950	1800	1650
					z	2640	2520	2360	2120	1830	1520	1250	1030	857	723	617	532	463
	16.0 †	78.9	1	3400	y	**3400**	3370	3310	3240	3170	3080	2980	2860	2720	2560	2380	2200	2010
					z	3290	3130	2900	2590	2190	1800	1470	1200	1000	842	717	618	537

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
† Sections marked thus are not included in BS4848: Part 2.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
250x150	5.0 †	30.5	4	1130	y	1120	1080	1040	984	913	822	720	620	531	456	393	342	299
					z	1080	1020	918	780	629	500	400	325	269	225	191	165	143
	6.3	38.2	4	1560	y	1530	1480	1410	1330	1220	1080	929	790	671	572	492	427	373
					z	1480	1380	1220	1010	799	627	499	404	333	279	237	203	176
	8.0	48.0	2	2070	y	2030	1950	1860	1740	1580	1380	1180	994	840	715	614	531	464
					z	1960	1810	1580	1280	1000	780	619	500	411	344	292	251	217
	10.0	59.3	1	2550	y	2500	2410	2300	2140	1940	1690	1440	1210	1020	868	745	645	563
					z	2410	2220	1940	1560	1210	942	745	602	495	414	351	301	261
	12.5	73.0	1	3140	y	3080	2960	2820	2620	2360	2050	1740	1460	1230	1050	897	776	677
					z	2960	2720	2350	1880	1450	1120	889	718	590	493	418	359	311
	16.0	91.5	1	3940	y	3850	3710	3520	3260	2920	2520	2120	1780	1500	1270	1090	941	821
					z	3700	3380	2890	2280	1750	1350	1060	858	705	589	499	428	371
260x140	6.3 †	38.2	4	1530	y	1510	1460	1400	1320	1220	1090	951	815	695	595	513	445	390
					z	1440	1330	1160	936	726	565	447	361	297	248	211	181	157
	8.0 †	48.0	2	2070	y	2030	1960	1870	1760	1600	1420	1220	1030	876	747	642	556	486
					z	1940	1770	1510	1190	909	702	554	446	367	306	260	223	193
	10.0 †	59.3	1	2550	y	2510	2420	2310	2160	1970	1730	1480	1260	1060	907	779	675	589
					z	2390	2180	1840	1440	1100	845	666	536	441	368	312	267	232
	12.5 †	73.0	1	3140	y	3090	2970	2840	2650	2410	2110	1800	1520	1280	1090	939	813	709
					z	2940	2660	2230	1730	1310	1010	793	638	524	437	370	318	275
	16.0 †	91.5	1	3940	y	3860	3720	3540	3300	2980	2590	2200	1850	1560	1330	1140	986	860
					z	3660	3300	2730	2090	1570	1200	945	760	624	520	441	378	327
300x100	6.3 †	38.2	4	1400	y	1390	1350	1310	1260	1190	1100	994	879	768	667	581	508	446
					z	1270	1080	810	580	424	321	250	200	164	136	115	98.8	85.5
	8.0 †	48.0	4	1980	y	1960	1900	1830	1740	1630	1480	1320	1140	985	849	734	639	560
					z	1760	1440	1030	722	523	394	306	245	200	167	141	120	104
	10.0 †	59.3	2	2550	y	2520	2440	2350	2230	2070	1870	1640	1410	1210	1040	897	780	683
					z	2240	1790	1250	865	624	469	365	291	238	198	167	143	124
	12.5 †	73.0	1	3140	y	3100	3000	2880	2730	2530	2270	1990	1710	1460	1250	1080	940	822
					z	2730	2140	1480	1020	732	550	427	341	278	232	196	167	145
	16.0 †	91.5	1	3940	y	3880	3750	3600	3400	3140	2800	2440	2090	1780	1530	1310	1140	998
					z	3380	2580	1740	1190	856	641	498	397	324	269	228	195	168
300x200	6.3	48.1	4	1830	y	1820	1780	1730	1670	1590	1500	1380	1250	1110	978	859	756	667
					z	1790	1720	1630	1510	1360	1170	986	826	695	589	505	436	381
	8.0	60.5	4	2530	y	2510	2440	2370	2270	2160	2010	1830	1630	1430	1250	1090	956	842
					z	2460	2360	2220	2030	1790	1510	1260	1040	874	739	631	545	475
	10.0	75.0	2	3230	y	3210	3120	3020	2890	2730	2530	2290	2030	1770	1540	1340	1170	1030
					z	3140	3000	2820	2560	2230	1870	1540	1280	1070	901	769	664	578
	12.5	92.6	1	3990	y	3960	3850	3720	3560	3360	3110	2810	2480	2160	1880	1630	1430	1250
					z	3880	3700	3470	3140	2720	2270	1870	1540	1290	1090	928	800	696
	16.0	117	1	5020	y	4980	4840	4670	4470	4210	3880	3480	3070	2660	2310	2010	1750	1540
					z	4870	4640	4340	3910	3360	2790	2290	1880	1570	1320	1130	973	846

y - y is the major axis and z - z is the minor axis.

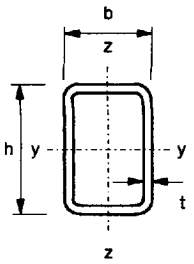
Classification is for buckling about either y - y axis or z - z axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
300x250	6.3 †	53.0	4	1960	y	1950	1910	1860	1800	1720	1630	1520	1390	1250	1110	985	871	771
					z	1940	1880	1820	1740	1640	1520	1370	1200	1050	909	790	690	606
	8.0 †	66.8	4	2800	y	2780	2710	2630	2530	2410	2260	2070	1860	1650	1450	1270	1110	981
					z	2760	2680	2570	2450	2280	2060	1820	1570	1350	1160	1000	873	765
	10.0 †	82.8	2	3570	y	3550	3450	3350	3220	3060	2850	2600	2320	2040	1790	1560	1370	1200
					z	3520	3410	3270	3100	2870	2580	2260	1940	1660	1430	1230	1070	936
	12.5 †	102	1	4410	y	4380	4270	4130	3970	3770	3510	3190	2840	2500	2180	1900	1660	1470
					z	4350	4210	4040	3820	3530	3170	2760	2370	2020	1730	1490	1300	1140
	16.0 †	129	1	5560	y	5520	5370	5200	4990	4730	4390	3980	3530	3090	2690	2350	2050	1800
					z	5480	5300	5080	4790	4410	3940	3420	2920	2490	2130	1840	1590	1390
350x150	6.3 †	48.1	4	1660	y	**1660**	1630	1590	1550	1500	1440	1370	1280	1180	1070	960	859	768
					z	1600	1510	1380	1210	998	805	650	531	439	369	314	270	235
	8.0 †	60.5	4	2350	y	**2350**	2290	2230	2170	2090	1990	1870	1720	1560	1400	1240	1100	980
					z	2240	2100	1890	1600	1290	1020	817	663	548	459	390	335	291
	10.0 †	75.0	3	3230	y	3220	3140	3060	2950	2830	2670	2470	2250	2010	1780	1560	1380	1220
					z	3060	2840	2510	2050	1610	1260	1000	810	667	558	473	406	353
	12.5 †	92.6	1	3990	y	3980	3880	3770	3640	3480	3280	3040	2750	2450	2170	1900	1680	1480
					z	3780	3490	3060	2490	1940	1510	1200	969	798	667	566	486	422
	16.0 †	117	1	5020	y	5000	4880	4740	4570	4360	4100	3780	3420	3040	2670	2350	2060	1820
					z	4740	4360	3790	3040	2350	1830	1440	1170	959	802	680	583	506
350x250	8.0 †	73.1	4	2890	y	**2890**	2830	2770	2690	2610	2500	2370	2220	2040	1850	1670	1490	1330
					z	2860	2780	2680	2560	2400	2210	1970	1730	1500	1290	1120	979	859
	10.0 †	90.7	3	3910	y	**3910**	3820	3730	3620	3490	3330	3130	2890	2630	2360	2110	1870	1660
					z	3860	3740	3590	3410	3170	2870	2530	2180	1870	1610	1390	1210	1060
	12.5 †	112	1	4830	y	**4830**	4730	4610	4470	4310	4100	3860	3560	3230	2900	2580	2290	2030
					z	4770	4620	4440	4210	3910	3520	3090	2670	2280	1960	1690	1470	1290
	16.0 †	142	1	6100	y	**6100**	5960	5810	5630	5420	5160	4830	4450	4030	3600	3200	2840	2520
					z	6020	5820	5590	5290	4890	4390	3840	3300	2820	2410	2080	1810	1580
400x150	6.3 †	53.0	4	1690	y	**1690**	1680	1640	1610	1570	1530	1480	1420	1340	1260	1170	1080	983
					z	1630	1550	1440	1280	1080	885	720	591	491	413	352	303	263
	8.0 †	66.8	4	2410	y	**2410**	2380	2330	2280	2220	2150	2060	1960	1840	1700	1560	1410	1280
					z	2320	2180	1990	1720	1410	1130	910	742	614	515	438	377	327
	10.0 †	82.8	4	3330	y	**3330**	3280	3200	3120	3030	2920	2780	2610	2420	2210	2000	1800	1610
					z	3180	2970	2660	2230	1780	1400	1120	907	749	627	532	457	397
	12.5 †	102	2	4410	y	**4410**	4330	4230	4110	3970	3810	3610	3360	3090	2790	2510	2240	2000
					z	4180	3880	3410	2790	2180	1710	1350	1090	901	754	640	549	477
	16.0 †	129	1	5560	y	**5560**	5450	5320	5170	5000	4780	4520	4200	3850	3470	3110	2770	2470
					z	5260	4850	4230	3410	2650	2060	1630	1320	1090	908	770	661	573

y - y is the major axis and z - z is the minor axis.

Classification is for buckling about either y - y axis or z - z axis.

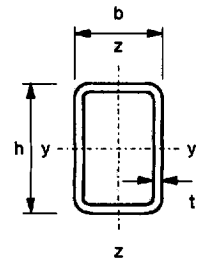
† Sections marked thus are not included in BS4848: Part 2.

Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

COMPRESSION

RECTANGULAR HOLLOW SECTIONS SUBJECT TO AXIAL COMPRESSION



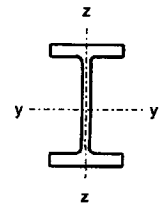
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per	Class	Cross Section	Design (UK) buckling resistance of compression member $N_{b.Rd}$ (kN)													
Size h x b	Thick-ness t	Metre		Resist. $N_{c.Rd}$	Axis	Buckling length in metres												
mm.mm	mm	kg/m		kN		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
400x200	6.3 †	57.9	4	1900	y	**1900**	1890	1860	1820	1780	1730	1680	1610	1530	1450	1350	1250	1140
					z	1880	1810	1740	1640	1510	1350	1170	1010	857	733	632	548	479
	8.0	73.1	4	2680	y	**2680**	2650	2600	2540	2480	2410	2320	2210	2090	1940	1790	1640	1490
					z	2630	2540	2420	2260	2050	1790	1530	1290	1090	927	795	688	601
	10.0	90.7	4	3670	y	**3670**	3620	3540	3460	3360	3250	3110	2940	2750	2530	2310	2090	1880
					z	3590	3440	3260	3010	2680	2290	1920	1610	1350	1140	978	845	737
	12.5	112	2	4830	y	**4830**	4760	4650	4530	4390	4230	4030	3790	3510	3210	2900	2600	2340
					z	4710	4510	4240	3880	3390	2860	2380	1970	1650	1390	1190	1030	894
	16.0	142	1	6100	y	**6100**	6000	5860	5710	5530	5320	5060	4750	4390	4000	3610	3240	2900
					z	5930	5670	5330	4840	4210	3530	2920	2410	2020	1700	1450	1250	1090
400x300	10.0 †	106	4	4350	y	**4350**	4300	4210	4120	4020	3900	3750	3580	3370	3140	2890	2640	2400
					z	4340	4240	4120	3990	3830	3630	3380	3090	2770	2460	2180	1920	1700
	12.5 †	132	2	5680	y	**5680**	5610	5490	5360	5220	5050	4840	4600	4310	3990	3650	3310	2990
					z	5660	5520	5360	5180	4950	4660	4310	3900	3470	3070	2700	2370	2100
	16.0 †	167	1	7190	y	**7190**	7090	6940	6780	6590	6370	6100	5790	5410	5000	4560	4130	3730
					z	7160	6980	6780	6540	6240	5860	5400	4880	4330	3810	3350	2940	2600
450x250	8.0 †	85.7	4	3000	y	**3000**	2990	2950	2900	2840	2780	2710	2630	2530	2420	2300	2160	2010
					z	2990	2910	2820	2720	2590	2420	2220	1990	1760	1540	1350	1180	1040
	10.0	106	4	4110	y	**4110**	4090	4020	3940	3860	3770	3660	3530	3390	3210	3020	2810	2600
					z	4080	3960	3830	3670	3470	3200	2890	2550	2230	1930	1680	1470	1290
	12.5	132	3	5680	y	**5680**	5630	5530	5420	5290	5140	4970	4770	4530	4260	3960	3640	3330
					z	5610	5440	5240	4990	4660	4230	3750	3250	2800	2410	2080	1810	1590
	16.0	167	1	7190	y	**7190**	7120	6990	6840	6680	6490	6270	6010	5700	5350	4960	4560	4160
					z	7100	6880	6620	6280	5850	5300	4670	4040	3470	2980	2570	2240	1960
500x200	8.0 †	85.7	4	2770	y	**2770**	**2770**	2740	2700	2650	2610	2550	2490	2420	2350	2260	2150	2040
					z	2730	2650	2540	2410	2230	2000	1750	1500	1290	1100	951	826	723
	10.0 †	106	4	3850	y	**3850**	**3850**	3790	3730	3660	3590	3510	3410	3300	3170	3030	2870	2690
					z	3780	3650	3480	3270	2970	2620	2240	1900	1610	1370	1180	1020	890
	12.5 †	132	4	5310	y	**5310**	5290	5210	5110	5010	4900	4770	4620	4440	4240	4010	3760	3490
					z	5190	4990	4730	4380	3910	3360	2830	2360	1990	1680	1440	1250	1090
	16.0 †	167	2	7190	y	**7190**	7140	7020	6890	6740	6580	6380	6160	5900	5590	5250	4880	4500
					z	7000	6700	6310	5770	5060	4270	3540	2940	2460	2080	1780	1530	1340
500x300	10.0	122	4	4530	y	**4530**	**4530**	4470	4400	4330	4250	4160	4050	3940	3800	3650	3480	3290
					z	**4530**	4440	4330	4210	4060	3890	3670	3410	3120	2810	2520	2240	2000
	12.5	152	4	6160	y	**6160**	6150	6050	5960	5850	5730	5590	5440	5260	5050	4820	4550	4270
					z	6150	6010	5850	5670	5450	5180	4840	4440	4010	3580	3170	2810	2490
	16.0	192	2	8270	y	**8270**	8240	8110	7970	7820	7650	7450	7220	6960	6660	6310	5930	5520
					z	8240	8040	7820	7560	7230	6830	6330	5750	5140	4550	4000	3530	3120
	20.0 ∇	237	1	10200	y	**10200**	**10200**	10000	9840	9640	9430	9180	8900	8570	8180	7740	7260	6750
					z	**10200**	9930	9650	9310	8900	8380	7740	7010	6240	5510	4840	4260	3770

y - y is the major axis and z - z is the minor axis.
Classification is for buckling about either y - y axis or z - z axis.
† Sections marked thus are not included in BS4848: Part 2.
∇ Sections marked thus are normally available in grade S 355 only.
Bold values are those equal to $N_{c.Rd}$ (i.e. cross section resistance).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.2.

BENDING

UB SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres												Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
127x76x13	1.0	25.4	22.6	19.3	16.4	14.0	12.2	10.8	9.68	8.77	8.01	7.38	6.83	6.37	473
$M_{c.y.Rd}$ = 28.5	0.8	26.5	24.8	22.9	20.8	18.8	16.9	15.3	14.0	12.8	11.8	10.9	10.2	9.52	
$M_{c.z.Rd}$ = 7.63	0.6	**28.5**	26.4	25.4	24.4	23.3	22.2	21.1	20.0	18.9	17.8	16.9	16.0	15.1	
Class 1	0.4	**28.5**	**28.5**	**28.5**	26.7	26.3	25.8	25.4	25.0	24.5	24.1	23.6	23.1	22.7	
152x89x16	1.0	38.1	34.2	29.5	24.9	21.1	18.2	16.0	14.2	12.8	11.7	10.7	9.88	9.18	834
$M_{c.y.Rd}$ = 41.7	0.8	39.4	37.1	34.3	31.2	28.0	25.1	22.6	20.5	18.7	17.1	15.8	14.7	13.7	
$M_{c.z.Rd}$ = 10.5	0.6	**41.7**	39.1	37.7	36.1	34.5	32.8	31.0	29.3	27.6	26.0	24.5	23.1	21.9	
Class 1	0.4	**41.7**	**41.7**	**41.7**	39.3	38.6	37.9	37.2	36.6	35.9	35.2	34.5	33.8	33.0	
178x102x19	1.0	53.8	49.2	43.2	36.7	31.0	26.5	23.1	20.4	18.2	16.5	15.1	13.9	12.9	1356
$M_{c.y.Rd}$ = 57.9	0.8	**57.9**	52.5	49.0	44.8	40.4	36.2	32.4	29.2	26.5	24.3	22.3	20.7	19.3	
$M_{c.z.Rd}$ = 14.1	0.6	**57.9**	54.9	53.0	50.9	48.7	46.3	43.8	41.3	38.9	36.6	34.4	32.5	30.6	
Class 1	0.4	**57.9**	**57.9**	**57.9**	54.9	53.9	53.0	52.0	51.1	50.1	49.1	48.1	47.1	46.0	
203x102x23	1.0	73.6	67.4	59.2	50.3	42.6	36.5	31.7	28.1	25.1	22.8	20.8	19.2	17.8	2105
$M_{c.y.Rd}$ = 79.1	0.8	**79.1**	71.7	67.0	61.4	55.4	49.7	44.6	40.2	36.5	33.4	30.8	28.5	26.5	
$M_{c.z.Rd}$ = 16.8	0.6	**79.1**	75.1	72.5	69.7	66.6	63.4	60.1	56.7	53.4	50.3	47.3	44.6	42.2	
Class 1	0.4	**79.1**	**79.1**	**79.1**	75.0	73.7	72.5	71.2	69.9	68.6	67.3	65.9	64.5	63.1	
203x133x25	1.0	**87.1**	79.1	73.2	65.8	57.7	50.0	43.5	38.3	34.0	30.6	27.8	25.4	23.4	2340
$M_{c.y.Rd}$ = 87.1	0.8	**87.1**	82.0	78.4	74.1	69.1	63.6	58.0	52.8	48.0	43.9	40.3	37.3	34.6	
$M_{c.z.Rd}$ = 24.0	0.6	**87.1**	**87.1**	82.3	80.0	77.5	74.7	71.7	68.6	65.4	62.1	58.9	55.8	52.9	
Class 2	0.4	**87.1**	**87.1**	**87.1**	**87.1**	83.0	81.8	80.5	79.3	78.1	76.8	75.6	74.3	72.9	
203x133x30	1.0	**106**	97.0	90.6	82.8	74.1	65.6	58.1	51.8	46.6	42.2	38.6	35.6	32.9	2896
$M_{c.y.Rd}$ = 106	0.8	**106**	100	96.5	91.9	86.7	81.1	75.2	69.5	64.2	59.4	55.2	51.4	48.0	
$M_{c.z.Rd}$ = 29.8	0.6	**106**	**106**	101	98.3	95.7	92.8	89.9	86.8	83.6	80.3	77.1	73.8	70.7	
Class 1	0.4	**106**	**106**	**106**	**106**	**106**	100	99.2	98.0	96.7	95.5	94.2	93.0	91.7	
254x102x22	1.0	79.9	70.4	57.3	44.9	35.7	29.3	24.7	21.3	18.7	16.7	15.0	13.7	12.6	2841
$M_{c.y.Rd}$ = 87.6	0.8	82.7	77.0	69.0	59.4	50.0	42.3	36.3	31.6	28.0	25.1	22.7	20.8	19.2	
$M_{c.z.Rd}$ = 12.6	0.6	**87.6**	81.7	77.6	72.7	66.9	60.8	54.9	49.5	44.9	40.9	37.5	34.6	32.1	
Class 1	0.4	**87.6**	**87.6**	83.3	81.2	79.0	76.6	74.1	71.4	68.7	65.9	63.1	60.3	57.7	
254x102x25	1.0	94.9	84.7	70.8	56.9	46.0	38.2	32.5	28.2	24.9	22.3	20.2	18.5	17.1	3415
$M_{c.y.Rd}$ = 103	0.8	98.0	91.8	83.5	73.4	63.2	54.4	47.3	41.6	37.1	33.5	30.5	28.0	25.8	
$M_{c.z.Rd}$ = 15.6	0.6	**103**	96.9	92.6	87.5	81.8	75.5	69.3	63.4	58.1	53.5	49.4	45.8	42.7	
Class 1	0.4	**103**	**103**	**103**	96.5	94.2	91.8	89.4	86.8	84.1	81.4	78.6	75.9	73.1	
254x102x28	1.0	110	99.4	84.8	69.7	57.4	48.2	41.4	36.2	32.2	29.0	26.3	24.2	22.3	4005
$M_{c.y.Rd}$ = 119	0.8	114	107	98.3	88.0	77.3	67.6	59.5	52.9	47.5	43.1	39.4	36.3	33.6	
$M_{c.z.Rd}$ = 18.5	0.6	**119**	112	108	103	97.0	90.8	84.5	78.4	72.6	67.4	62.7	58.6	54.9	
Class 1	0.4	**119**	**119**	**119**	112	110	107	105	102	99.9	97.3	94.6	91.9	89.2	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

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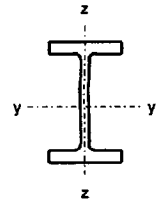
BENDING

UB SECTIONS SUBJECT TO BENDING



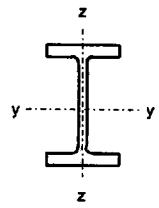
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	Second Moment of Area y-y Axis I_y cm^4
254x146x31	1.0	**133**	122	114	104	92.0	79.9	69.2	60.4	53.3	47.6	42.9	39.0	35.7	4413
$M_{c.y.Rd}$ = 133	0.8	**133**	126	121	115	108	99.8	91.1	82.6	74.9	68.1	62.2	57.1	52.8	
$M_{c.z.Rd}$ = 31.8	0.6	**133**	**133**	126	123	119	115	111	106	101	95.7	90.5	85.5	80.8	
Class 2	0.4	**133**	**133**	**133**	**133**	**133**	125	123	122	120	118	116	113	111	
254x146x37	1.0	**163**	151	142	131	118	105	92.8	82.3	73.6	66.3	60.3	55.2	51.0	5537
$M_{c.y.Rd}$ = 163	0.8	**163**	**163**	150	144	136	128	119	109	101	93.0	85.9	79.7	74.2	
$M_{c.z.Rd}$ = 40.4	0.6	**163**	**163**	**163**	152	148	144	140	135	130	125	119	114	109	
Class 1	0.4	**163**	**163**	**163**	**163**	**163**	155	153	151	149	147	145	143	141	
254x146x43	1.0	**191**	178	168	156	143	129	115	104	93.6	85.0	77.8	71.7	66.5	6544
$M_{c.y.Rd}$ = 191	0.8	**191**	**191**	177	170	162	153	144	135	126	117	109	102	95.6	
$M_{c.z.Rd}$ = 47.7	0.6	**191**	**191**	**191**	179	175	171	166	161	157	151	146	141	136	
Class 1	0.4	**191**	**191**	**191**	**191**	**191**	**191**	181	179	177	175	173	171	169	
305x102x25	1.0	105	90.8	71.7	54.8	42.8	34.6	28.8	24.7	21.5	19.1	17.1	15.5	14.2	4455
$M_{c.y.Rd}$ = 116	0.8	109	100	88.4	74.1	61.0	50.6	42.8	36.9	32.4	28.8	26.0	23.6	21.7	
$M_{c.z.Rd}$ = 13.1	0.6	**116**	107	101	93.6	84.6	75.3	66.7	59.2	52.9	47.7	43.4	39.8	36.7	
Class 1	0.4	**116**	**116**	109	106	103	99.1	95.0	90.7	86.2	81.7	77.3	73.1	69.2	
305x102x28	1.0	124	110	89.4	70.0	55.5	45.4	38.2	32.9	28.8	25.7	23.1	21.1	19.4	5366
$M_{c.y.Rd}$ = 136	0.8	129	120	108	92.5	77.8	65.6	56.2	48.9	43.2	38.7	35.0	32.0	29.4	
$M_{c.z.Rd}$ = 16.4	0.6	**136**	127	121	113	104	94.5	85.1	76.7	69.3	63.1	57.7	53.2	49.3	
Class 1	0.4	**136**	**136**	130	126	123	119	115	111	107	102	97.7	93.3	89.1	
305x102x33	1.0	149	134	112	89.7	72.7	60.3	51.2	44.5	39.3	35.2	31.9	29.2	26.9	6501
$M_{c.y.Rd}$ = 163	0.8	154	145	132	116	99.8	85.8	74.6	65.6	58.5	52.7	48.0	44.1	40.7	
$M_{c.z.Rd}$ = 20.3	0.6	**163**	153	146	138	129	119	109	100	91.7	84.3	77.9	72.3	67.4	
Class 1	0.4	**163**	**163**	**163**	152	148	145	141	137	132	128	124	119	115	
305x127x37	1.0	173	161	144	124	104	88.1	75.4	65.5	57.8	51.7	46.8	42.7	39.3	7171
$M_{c.y.Rd}$ = 182	0.8	**182**	169	159	147	133	119	105	93.8	84.1	76.1	69.4	63.7	58.9	
$M_{c.z.Rd}$ = 28.9	0.6	**182**	**182**	169	163	156	148	140	132	123	115	107	100	94.2	
Class 1	0.4	**182**	**182**	**182**	**182**	171	168	165	161	158	155	151	147	144	
305x127x42	1.0	197	184	166	145	124	106	91.5	80.2	71.3	64.1	58.2	53.3	49.2	8196
$M_{c.y.Rd}$ = 207	0.8	**207**	192	182	170	155	140	126	113	103	93.4	85.6	79.0	73.3	
$M_{c.z.Rd}$ = 33.3	0.6	**207**	**207**	193	187	180	172	164	155	146	138	130	122	115	
Class 1	0.4	**207**	**207**	**207**	**207**	195	192	189	186	182	179	175	172	168	
305x127x48	1.0	228	214	196	174	151	131	115	102	90.9	82.2	75.0	69.0	63.9	9575
$M_{c.y.Rd}$ = 240	0.8	**240**	224	213	200	185	170	155	141	129	118	109	101	94.4	
$M_{c.z.Rd}$ = 39.2	0.6	**240**	**240**	225	218	211	203	195	186	178	169	161	152	145	
Class 1	0.4	**240**	**240**	**240**	**240**	228	224	221	218	214	211	208	204	201	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



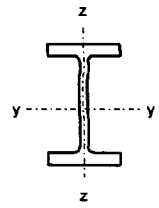
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
305x165x40	1.0	**211**	198	188	175	159	142	125	110	96.9	86.3	77.5	70.3	64.2	8503
$M_{c.y.Rd}$ = 211	0.8	**211**	**211**	196	188	179	169	157	144	132	121	111	102	93.7	
$M_{c.z.Rd}$ = 47.9	0.6	**211**	**211**	**211**	198	193	188	182	176	169	161	154	146	139	
Class 1	0.4	**211**	**211**	**211**	**211**	**211**	**211**	198	196	193	190	187	184	181	
305x165x46	1.0	**243**	229	218	204	188	169	150	133	119	107	96.6	88.1	80.9	9899
$M_{c.y.Rd}$ = 243	0.8	**243**	**243**	227	219	209	198	186	173	160	147	136	126	117	
$M_{c.z.Rd}$ = 56.0	0.6	**243**	**243**	**243**	230	225	219	213	206	199	192	184	176	169	
Class 1	0.4	**243**	**243**	**243**	**243**	**243**	**243**	230	227	224	222	219	216	213	
305x165x54	1.0	**286**	269	257	242	224	205	185	166	150	135	123	113	105	11700
$M_{c.y.Rd}$ = 286	0.8	**286**	**286**	268	259	248	237	224	210	197	183	171	160	149	
$M_{c.z.Rd}$ = 66.1	0.6	**286**	**286**	**286**	271	265	259	253	246	239	231	224	216	208	
Class 1	0.4	**286**	**286**	**286**	**286**	**286**	**286**	272	269	266	263	260	257	254	
356x127x33	1.0	173	160	141	117	94.8	77.4	64.5	54.8	47.5	41.8	37.3	33.6	30.6	8249
$M_{c.y.Rd}$ = 184	0.8	**184**	169	157	143	125	108	92.5	80.2	70.3	62.4	56.0	50.7	46.4	
$M_{c.z.Rd}$ = 23.8	0.6	**184**	**184**	169	162	153	142	131	119	109	98.9	90.4	83.0	76.6	
Class 1	0.4	**184**	**184**	**184**	174	170	166	162	157	152	147	142	136	131	
356x127x39	1.0	211	196	175	149	123	103	86.6	74.4	65.1	57.7	51.9	47.1	43.1	10170
$M_{c.y.Rd}$ = 223	0.8	**223**	206	193	178	159	140	122	108	95.4	85.5	77.3	70.5	64.8	
$M_{c.z.Rd}$ = 30.1	0.6	**223**	**223**	207	198	189	178	167	155	143	132	122	113	105	
Class 1	0.4	**223**	**223**	**223**	**223**	208	204	199	195	190	185	180	174	169	
356x171x45	1.0	**262**	245	233	216	196	172	150	130	114	101	89.9	80.9	73.5	12070
$M_{c.y.Rd}$ = 262	0.8	**262**	**262**	243	233	221	207	191	174	158	143	129	118	108	
$M_{c.z.Rd}$ = 49.6	0.6	**262**	**262**	**262**	246	240	232	224	215	206	195	184	174	164	
Class 2	0.4	**262**	**262**	**262**	**262**	**262**	249	246	242	238	234	230	226	221	
356x171x51	1.0	**303**	285	271	253	231	206	182	160	141	125	113	102	93.0	14140
$M_{c.y.Rd}$ = 303	0.8	**303**	**303**	283	272	259	244	227	209	192	175	160	147	136	
$M_{c.z.Rd}$ = 58.9	0.6	**303**	**303**	**303**	286	279	271	263	253	244	233	222	211	200	
Class 1	0.4	**303**	**303**	**303**	**303**	**303**	**303**	286	282	278	274	270	265	261	
356x171x57	1.0	**342**	322	306	288	264	238	212	188	167	150	135	123	113	16040
$M_{c.y.Rd}$ = 342	0.8	**342**	**342**	319	308	294	279	261	243	224	206	190	176	163	
$M_{c.z.Rd}$ = 67.2	0.6	**342**	**342**	**342**	323	315	307	299	289	279	269	258	247	236	
Class 1	0.4	**342**	**342**	**342**	**342**	**342**	**342**	323	319	315	311	307	302	298	
356x171x67	1.0	**409**	387	370	349	324	297	268	241	217	197	179	164	151	19460
$M_{c.y.Rd}$ = 409	0.8	**409**	**409**	384	372	357	341	323	304	284	265	247	231	216	
$M_{c.z.Rd}$ = 82.1	0.6	**409**	**409**	**409**	389	380	372	363	353	343	333	322	311	300	
Class 1	0.4	**409**	**409**	**409**	**409**	**409**	**409**	389	385	381	377	372	368	364	
406x140x39	1.0	**245**	219	199	172	142	117	97.4	82.3	70.8	61.8	54.7	49.0	44.3	12510
$M_{c.y.Rd}$ = 245	0.8	**245**	229	216	200	180	158	137	119	104	91.7	81.7	73.6	66.8	
$M_{c.z.Rd}$ = 30.7	0.6	**245**	**245**	229	221	211	199	185	171	156	142	130	119	109	
Class 2	0.4	**245**	**245**	**245**	**245**	230	225	220	214	208	202	195	188	180	
406x140x46	1.0	**300**	272	249	220	187	157	132	113	98.1	86.4	77.0	69.5	63.2	15690
$M_{c.y.Rd}$ = 300	0.8	**300**	282	268	251	230	206	182	160	142	127	114	104	94.8	
$M_{c.z.Rd}$ = 39.9	0.6	**300**	**300**	283	273	263	250	236	221	206	191	177	164	152	
Class 1	0.4	**300**	**300**	**300**	**300**	284	279	273	268	261	255	248	242	234	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



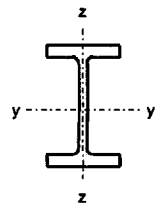
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
406x178x54	1.0	**357**	335	319	298	271	240	210	183	160	141	125	113	102	18720
$M_{c.y.Rd}$ = 357	0.8	**357**	**357**	333	320	304	286	264	241	219	198	180	164	150	
$M_{c.z.Rd}$ = 60.3	0.6	**357**	**357**	**357**	336	328	318	308	296	283	269	254	240	226	
Class 2	0.4	**357**	**357**	**357**	**357**	**357**	**357**	335	330	325	320	315	309	303	
406x178x60	1.0	**406**	383	365	342	314	282	249	219	193	171	154	139	126	21600
$M_{c.y.Rd}$ = 406	0.8	**406**	**406**	380	366	350	330	308	284	261	238	218	200	184	
$M_{c.z.Rd}$ = 70.7	0.6	**406**	**406**	**406**	384	375	365	354	342	329	314	300	285	271	
Class 1	0.4	**406**	**406**	**406**	**406**	**406**	**406**	383	378	373	367	362	356	350	
406x178x67	1.0	**455**	430	411	386	357	322	287	254	226	202	182	165	151	24330
$M_{c.y.Rd}$ = 455	0.8	**455**	**455**	427	412	395	374	351	327	302	278	256	236	218	
$M_{c.z.Rd}$ = 80.0	0.6	**455**	**455**	**455**	431	422	411	400	387	374	360	345	330	315	
Class 1	0.4	**455**	**455**	**455**	**455**	**455**	**455**	431	426	420	415	409	403	398	
406x178x74	1.0	**507**	480	459	434	403	367	330	295	264	237	215	196	180	27310
$M_{c.y.Rd}$ = 507	0.8	**507**	**507**	477	461	443	422	398	373	347	322	299	277	258	
$M_{c.z.Rd}$ = 90.3	0.6	**507**	**507**	**507**	482	472	461	449	436	423	409	394	379	364	
Class 1	0.4	**507**	**507**	**507**	**507**	**507**	**507**	482	477	471	465	460	454	448	
457x152x52	1.0	**371**	338	312	278	238	199	168	143	123	108	95.7	85.8	77.7	21370
$M_{c.y.Rd}$ = 371	0.8	**371**	350	334	314	289	260	230	202	178	158	142	128	117	
$M_{c.z.Rd}$ = 45.1	0.6	**371**	**371**	350	339	327	312	295	276	257	237	219	202	187	
Class 1	0.4	**371**	**371**	**371**	**371**	352	345	339	331	324	316	307	298	289	
457x152x60	1.0	**435**	399	372	335	291	248	212	182	159	140	125	113	102	25500
$M_{c.y.Rd}$ = 435	0.8	**435**	413	395	374	347	317	284	254	226	203	183	167	153	
$M_{c.z.Rd}$ = 55.1	0.6	**435**	**435**	413	401	388	372	355	336	316	296	276	257	240	
Class 1	0.4	**435**	**435**	**435**	**435**	**435**	408	401	394	386	378	370	361	352	
457x152x67	1.0	**491**	452	422	383	336	290	249	216	190	168	151	137	125	28930
$M_{c.y.Rd}$ = 491	0.8	**491**	467	448	425	397	365	331	298	268	242	220	201	185	
$M_{c.z.Rd}$ = 63.1	0.6	**491**	**491**	467	455	440	424	406	387	367	346	325	306	287	
Class 1	0.4	**491**	**491**	**491**	**491**	**491**	462	455	447	440	431	423	415	406	
457x152x74	1.0	**550**	507	476	435	387	337	293	256	226	202	182	166	152	32670
$M_{c.y.Rd}$ = 550	0.8	**550**	523	503	479	451	418	383	348	316	288	263	242	224	
$M_{c.z.Rd}$ = 72.1	0.6	**550**	**550**	**550**	511	496	480	462	442	422	401	380	359	340	
Class 1	0.4	**550**	**550**	**550**	**550**	**550**	520	512	504	496	488	480	472	463	
457x152x82	1.0	**612**	566	533	490	440	388	340	300	267	239	217	198	182	36590
$M_{c.y.Rd}$ = 612	0.8	**612**	**612**	562	537	508	474	438	402	368	338	311	287	266	
$M_{c.z.Rd}$ = 81.3	0.6	**612**	**612**	**612**	571	555	538	520	501	480	459	438	417	397	
Class 1	0.4	**612**	**612**	**612**	**612**	**612**	581	573	565	557	549	541	532	524	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



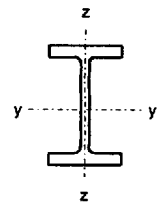
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b,Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
457x191x67	1.0	**497**	472	452	426	394	356	315	277	244	216	193	173	157	29380
$M_{c.y.Rd}$ = 497	0.8	**497**	**497**	468	453	434	411	385	356	327	298	272	249	228	
$M_{c.z.Rd}$ = 80.2	0.6	**497**	**497**	**497**	473	462	450	437	423	407	390	372	353	334	
Class 1	0.4	**497**	**497**	**497**	**497**	**497**	**497**	471	465	459	452	445	438	431	
457x191x74	1.0	**559**	531	509	482	448	408	365	323	287	255	229	207	189	33320
$M_{c.y.Rd}$ = 559	0.8	**559**	**559**	528	510	490	467	440	410	379	349	321	295	272	
$M_{c.z.Rd}$ = 92.0	0.6	**559**	**559**	**559**	532	521	509	495	480	464	446	428	409	390	
Class 1	0.4	**559**	**559**	**559**	**559**	**559**	**559**	531	525	518	511	504	497	490	
457x191x82	1.0	**619**	589	565	536	500	458	413	369	329	295	266	241	220	37050
$M_{c.y.Rd}$ = 619	0.8	**619**	**619**	585	567	546	521	493	462	430	398	368	341	316	
$M_{c.z.Rd}$ = 103	0.6	**619**	**619**	**619**	**619**	578	565	551	536	519	502	483	464	444	
Class 1	0.4	**619**	**619**	**619**	**619**	**619**	**619**	**619**	583	576	569	562	555	547	
457x191x89	1.0	**681**	649	623	593	555	512	464	418	375	338	306	279	256	41020
$M_{c.y.Rd}$ = 681	0.8	**681**	**681**	645	625	603	578	549	517	485	452	420	391	364	
$M_{c.z.Rd}$ = 114	0.6	**681**	**681**	**681**	**681**	638	624	610	594	577	559	541	522	502	
Class 1	0.4	**681**	**681**	**681**	**681**	**681**	**681**	**681**	643	636	629	622	614	607	
457x191x98	1.0	**755**	**755**	693	660	621	576	527	478	433	392	357	327	302	45730
$M_{c.y.Rd}$ = 755	0.8	**755**	**755**	716	695	672	646	616	584	550	517	484	453	424	
$M_{c.z.Rd}$ = 128	0.6	**755**	**755**	**755**	**755**	709	695	680	664	647	629	610	591	572	
Class 1	0.4	**755**	**755**	**755**	**755**	**755**	**755**	**755**	715	708	701	693	686	679	
533x210x82	1.0	**696**	**696**	640	609	570	522	468	415	366	324	289	259	234	47540
$M_{c.y.Rd}$ = 696	0.8	**696**	**696**	661	641	618	590	557	520	481	441	403	369	338	
$M_{c.z.Rd}$ = 102	0.6	**696**	**696**	**696**	**696**	653	638	621	603	582	560	536	511	485	
Class 1	0.4	**696**	**696**	**696**	**696**	**696**	**696**	**696**	656	647	638	629	619	609	
533x210x92	1.0	**798**	**798**	737	703	662	611	554	496	442	394	353	319	289	55230
$M_{c.y.Rd}$ = 798	0.8	**798**	**798**	760	738	713	684	649	611	569	527	486	448	413	
$M_{c.z.Rd}$ = 120	0.6	**798**	**798**	**798**	**798**	751	735	717	698	677	654	630	604	578	
Class 1	0.4	**798**	**798**	**798**	**798**	**798**	**798**	**798**	755	746	737	727	717	707	
533x210x101	1.0	**883**	**883**	817	782	738	685	625	563	505	453	408	370	337	61520
$M_{c.y.Rd}$ = 883	0.8	**883**	**883**	**883**	819	792	762	726	686	643	599	556	515	478	
$M_{c.z.Rd}$ = 135	0.6	**883**	**883**	**883**	**883**	833	816	798	778	756	733	708	683	656	
Class 1	0.4	**883**	**883**	**883**	**883**	**883**	**883**	**883**	838	828	819	809	799	789	
533x210x109	1.0	**956**	**956**	886	849	803	748	686	621	560	505	457	415	380	66820
$M_{c.y.Rd}$ = 956	0.8	**956**	**956**	**956**	888	860	828	792	751	707	661	617	574	535	
$M_{c.z.Rd}$ = 147	0.6	**956**	**956**	**956**	**956**	903	886	867	846	824	801	776	750	723	
Class 1	0.4	**956**	**956**	**956**	**956**	**956**	**956**	**956**	909	899	889	879	869	859	
533x210x122	1.0	**1080**	**1080**	1000	964	915	857	792	724	658	598	545	498	458	76040
$M_{c.y.Rd}$ = 1080	0.8	**1080**	**1080**	**1080**	1010	977	943	905	863	818	771	724	679	636	
$M_{c.z.Rd}$ = 169	0.6	**1080**	**1080**	**1080**	**1080**	1020	1000	984	963	941	917	892	866	839	
Class 1	0.4	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	**1080**	1020	1010	1000	989	979	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



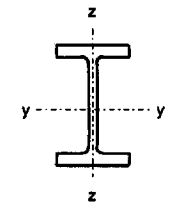
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
610x229x101	1.0	**974**	**974**	908	871	825	768	703	632	564	503	449	403	364	75780
$M_{c.y.Rd}$ = 974	0.8	**974**	**974**	**974**	909	881	848	809	765	715	663	612	563	517	
$M_{c.z.Rd}$ = 135	0.6	**974**	**974**	**974**	**974**	923	904	884	862	837	810	780	749	716	
Class 1	0.4	**974**	**974**	**974**	**974**	**974**	**974**	**974**	926	915	904	892	880	867	
610x229x113	1.0	**1110**	**1110**	1040	997	948	888	818	743	669	600	539	487	442	87320
$M_{c.y.Rd}$ = 1110	0.8	**1110**	**1110**	**1110**	1040	1010	973	932	886	834	780	725	671	622	
$M_{c.z.Rd}$ = 159	0.6	**1110**	**1110**	**1110**	**1110**	1050	1030	1010	989	963	935	905	873	839	
Class 1	0.4	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	**1110**	1050	1030	1020	1010	997	
610x229x125	1.0	**1240**	**1240**	1160	1120	1070	1010	933	853	773	699	632	573	523	98610
$M_{c.y.Rd}$ = 1240	0.8	**1240**	**1240**	**1240**	1170	1130	1100	1050	1010	952	895	838	781	727	
$M_{c.z.Rd}$ = 181	0.6	**1240**	**1240**	**1240**	**1240**	1180	1160	1140	1110	1090	1060	1030	996	962	
Class 1	0.4	**1240**	**1240**	**1240**	**1240**	**1240**	**1240**	**1240**	**1240**	1180	1160	1150	1140	1130	
610x229x140	1.0	**1400**	**1400**	1310	1270	1210	1150	1070	984	898	817	744	679	622	111800
$M_{c.y.Rd}$ = 1400	0.8	**1400**	**1400**	**1400**	1320	1280	1240	1200	1150	1090	1030	972	913	855	
$M_{c.z.Rd}$ = 207	0.6	**1400**	**1400**	**1400**	**1400**	**1400**	1310	1290	1260	1240	1210	1170	1140	1110	
Class 1	0.4	**1400**	**1400**	**1400**	**1400**	**1400**	**1400**	**1400**	**1400**	1330	1320	1300	1290	1280	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres 2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	Second Moment of Area y-y Axis I_y cm^4
610x305x149	1.0	**1550**	1440	1350	1240	1100	953	824	715	628	557	499	452	413	125900
$M_{c.y.Rd}$ = 1550	0.8	**1550**	**1550**	1420	1360	1280	1180	1080	975	881	797	725	663	610	
$M_{c.z.Rd}$ = 317	0.6	**1550**	**1550**	**1550**	1440	1400	1350	1300	1240	1180	1120	1060	994	936	
Class 1	0.4	**1550**	**1550**	**1550**	**1550**	**1550**	1470	1450	1420	1400	1370	1350	1320	1300	
610x305x179	1.0	**1880**	1740	1640	1510	1360	1200	1060	930	825	739	668	609	560	153000
$M_{c.y.Rd}$ = 1880	0.8	**1880**	**1880**	1730	1650	1560	1460	1350	1240	1140	1040	958	884	819	
$M_{c.z.Rd}$ = 387	0.6	**1880**	**1880**	**1880**	1750	1710	1650	1600	1540	1480	1410	1350	1280	1220	
Class 1	0.4	**1880**	**1880**	**1880**	**1880**	**1880**	1780	1760	1730	1710	1680	1660	1630	1610	
610x305x238	1.0	**2530**	2360	2240	2100	1930	1760	1580	1430	1290	1180	1080	992	920	209500
$M_{c.y.Rd}$ = 2530	0.8	**2530**	**2530**	2350	2260	2170	2060	1950	1830	1710	1600	1490	1400	1310	
$M_{c.z.Rd}$ = 532	0.6	**2530**	**2530**	**2530**	2380	2330	2280	2220	2160	2100	2030	1970	1900	1840	
Class 1	0.4	**2530**	**2530**	**2530**	**2530**	**2530**	**2530**	2400	2370	2340	2320	2290	2270	2240	
686x254x125	1.0	1280	1180	1040	870	706	576	479	406	351	308	274	247	224	118000
$M_{c.y.Rd}$ = 1350	0.8	**1350**	1240	1160	1060	928	799	686	594	519	460	412	372	340	
$M_{c.z.Rd}$ = 183	0.6	**1350**	**1350**	1250	1190	1130	1050	967	882	801	729	665	609	562	
Class 1	0.4	**1350**	**1350**	**1350**	1280	1250	1220	1190	1160	1120	1080	1040	1000	958	
686x254x140	1.0	1460	1360	1210	1030	845	697	584	499	434	383	343	310	283	136300
$M_{c.y.Rd}$ = 1540	0.8	**1540**	1430	1340	1230	1090	954	829	724	639	569	513	466	427	
$M_{c.z.Rd}$ = 216	0.6	**1540**	**1540**	1430	1370	1300	1230	1140	1050	966	887	816	753	698	
Class 1	0.4	**1540**	**1540**	**1540**	**1540**	1440	1410	1380	1340	1300	1270	1230	1180	1140	
686x254x152	1.0	1600	1500	1340	1150	954	794	670	576	503	446	400	363	332	150400
$M_{c.y.Rd}$ = 1690	0.8	**1690**	1570	1480	1360	1220	1080	944	830	737	660	596	544	500	
$M_{c.z.Rd}$ = 240	0.6	**1690**	**1690**	1570	1510	1440	1360	1280	1190	1100	1010	938	870	810	
Class 1	0.4	**1690**	**1690**	**1690**	**1690**	1580	1550	1520	1480	1450	1410	1370	1330	1290	
686x254x170	1.0	1810	1690	1530	1320	1110	937	799	691	608	542	488	444	408	170300
$M_{c.y.Rd}$ = 1900	0.8	**1900**	1770	1670	1550	1410	1250	1110	988	883	796	723	663	611	
$M_{c.z.Rd}$ = 274	0.6	**1900**	**1900**	1780	1710	1640	1560	1470	1380	1290	1200	1120	1050	978	
Class 1	0.4	**1900**	**1900**	**1900**	**1900**	1790	1760	1720	1690	1650	1610	1580	1540	1500	
762x267x134	1.0	1490	1380	1220	1020	827	671	554	467	401	350	309	277	251	150700
$M_{c.y.Rd}$ = 1570	0.8	**1570**	1450	1360	1230	1080	931	795	683	594	523	465	419	380	
$M_{c.z.Rd}$ = 193	0.6	**1570**	**1570**	1450	1390	1310	1220	1120	1020	920	832	754	688	630	
Class 2	0.4	**1570**	**1570**	**1570**	1490	1460	1420	1390	1340	1300	1250	1200	1150	1090	
762x267x147	1.0	1650	1540	1370	1160	949	776	644	546	471	412	366	329	299	168500
$M_{c.y.Rd}$ = 1740	0.8	**1740**	1610	1520	1390	1230	1070	918	795	695	615	549	496	452	
$M_{c.z.Rd}$ = 219	0.6	**1740**	**1740**	1620	1550	1470	1380	1270	1170	1060	967	882	808	745	
Class 1	0.4	**1740**	**1740**	**1740**	**1740**	1630	1590	1550	1510	1460	1410	1360	1310	1260	
762x267x173	1.0	1990	1870	1680	1450	1210	1000	844	723	629	556	497	449	410	205300
$M_{c.y.Rd}$ = 2100	0.8	**2100**	1950	1840	1700	1530	1350	1190	1040	920	821	740	673	617	
$M_{c.z.Rd}$ = 273	0.6	**2100**	**2100**	1950	1880	1800	1700	1590	1480	1370	1260	1160	1080	1000	
Class 1	0.4	**2100**	**2100**	**2100**	**2100**	1970	1930	1890	1840	1800	1750	1700	1650	1590	
762x267x197	1.0	**2420**	2170	1980	1730	1460	1230	1050	906	794	706	635	577	528	240000
$M_{c.y.Rd}$ = 2420	0.8	**2420**	2260	2150	2000	1820	1630	1450	1290	1150	1040	939	859	791	
$M_{c.z.Rd}$ = 324	0.6	**2420**	**2420**	2270	2190	2100	2010	1900	1780	1660	1550	1450	1350	1260	
Class 1	0.4	**2420**	**2420**	**2420**	**2420**	2290	2240	2200	2160	2110	2060	2020	1970	1910	

y - y is the major axis and z - z is the minor axis.

Classification is for bending about y - y axis.

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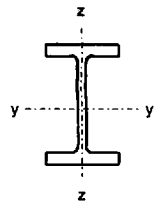
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UB SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres												Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
838x292x176	1.0	**2300**	2080	1900	1660	1390	1150	960	813	700	612	542	485	439	246000
$M_{c.y.Rd}$ = 2300	0.8	**2300**	2160	2050	1910	1730	1530	1340	1170	1020	904	807	727	661	
$M_{c.z.Rd}$ = 285	0.6	**2300**	**2300**	2160	2090	2000	1900	1780	1650	1510	1390	1270	1170	1080	
Class 1	0.4	**2300**	**2300**	**2300**	**2300**	2170	2130	2080	2030	1980	1920	1860	1800	1730	
838x292x194	1.0	**2580**	2340	2150	1900	1610	1350	1140	968	838	736	654	588	534	279200
$M_{c.y.Rd}$ = 2580	0.8	**2580**	2430	2320	2170	1980	1770	1570	1380	1220	1080	971	879	802	
$M_{c.z.Rd}$ = 329	0.6	**2580**	**2580**	2430	2360	2260	2160	2030	1900	1760	1630	1510	1390	1290	
Class 1	0.4	**2580**	**2580**	**2580**	**2580**	2440	2400	2350	2300	2250	2190	2130	2070	2010	
838x292x226	1.0	**3100**	2820	2620	2340	2030	1730	1470	1270	1110	985	882	798	729	339700
$M_{c.y.Rd}$ = 3100	0.8	**3100**	2920	2800	2640	2440	2220	1990	1780	1590	1430	1300	1180	1090	
$M_{c.z.Rd}$ = 410	0.6	**3100**	**3100**	2930	2840	2740	2630	2510	2370	2230	2090	1950	1830	1710	
Class 1	0.4	**3100**	**3100**	**3100**	**3100**	2940	2900	2850	2790	2740	2680	2630	2570	2500	
914x305x201	1.0	**2820**	2560	2360	2080	1760	1470	1230	1040	897	783	693	620	561	325300
$M_{c.y.Rd}$ = 2820	0.8	**2820**	2660	2530	2370	2170	1930	1700	1490	1300	1150	1030	928	843	
$M_{c.z.Rd}$ = 332	0.6	**2820**	**2820**	2660	2580	2470	2350	2220	2060	1910	1750	1610	1480	1360	
Class 1	0.4	**2820**	**2820**	**2820**	**2820**	2670	2620	2570	2510	2450	2380	2310	2240	2160	
914x305x224	1.0	**3220**	2940	2730	2430	2090	1760	1490	1270	1100	969	862	775	703	376400
$M_{c.y.Rd}$ = 3220	0.8	**3220**	3050	2910	2740	2530	2280	2030	1790	1590	1420	1270	1150	1050	
$M_{c.z.Rd}$ = 393	0.6	**3220**	**3220**	3050	2960	2850	2730	2590	2430	2270	2110	1950	1810	1680	
Class 1	0.4	**3220**	**3220**	**3220**	**3220**	3060	3010	2950	2890	2830	2760	2690	2620	2550	
914x305x253	1.0	**3700**	3390	3160	2850	2480	2120	1810	1560	1360	1200	1080	972	886	436300
$M_{c.y.Rd}$ = 3700	0.8	**3700**	3510	3360	3180	2950	2700	2430	2170	1940	1750	1580	1440	1320	
$M_{c.z.Rd}$ = 463	0.6	**3700**	**3700**	3510	3410	3300	3170	3020	2870	2700	2530	2370	2210	2070	
Class 1	0.4	**3700**	**3700**	**3700**	**3700**	**3700**	3470	3410	3350	3290	3220	3150	3080	3010	
914x305x289	1.0	**4250**	3910	3650	3320	2930	2540	2190	1910	1680	1490	1340	1220	1120	504200
$M_{c.y.Rd}$ = 4250	0.8	**4250**	4040	3870	3680	3450	3180	2890	2610	2360	2140	1950	1790	1650	
$M_{c.z.Rd}$ = 541	0.6	**4250**	**4250**	4040	3940	3810	3680	3530	3370	3200	3030	2860	2690	2540	
Class 1	0.4	**4250**	**4250**	**4250**	**4250**	**4250**	4000	3940	3880	3810	3750	3680	3610	3540	
914x419x343	1.0	**5230**	**5230**	4860	4660	4420	4120	3790	3450	3120	2810	2550	2320	2120	625800
$M_{c.y.Rd}$ = 5230	0.8	**5230**	**5230**	**5230**	4870	4720	4550	4360	4140	3910	3660	3420	3190	2980	
$M_{c.z.Rd}$ = 977	0.6	**5230**	**5230**	**5230**	**5230**	4950	4860	4750	4650	4530	4400	4270	4130	3990	
Class 1	0.4	**5230**	**5230**	**5230**	**5230**	**5230**	**5230**	**5230**	4980	4930	4880	4820	4770	4710	
914x419x388	1.0	**5970**	**5970**	5560	5340	5080	4770	4430	4060	3700	3370	3080	2820	2590	719600
$M_{c.y.Rd}$ = 5970	0.8	**5970**	**5970**	**5970**	5570	5410	5230	5030	4810	4570	4310	4060	3820	3580	
$M_{c.z.Rd}$ = 1130	0.6	**5970**	**5970**	**5970**	**5970**	5670	5560	5460	5340	5220	5100	4960	4820	4680	
Class 1	0.4	**5970**	**5970**	**5970**	**5970**	**5970**	**5970**	**5970**	**5970**	5650	5590	5540	5480	5430	

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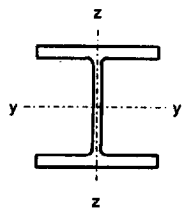
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
152x152x23	1.0	**55.5**	52.1	49.8	47.1	43.9	40.4	36.8	33.5	30.5	27.9	25.7	23.8	22.1	1250
$M_{c.y.Rd}$ = 55.5	0.8	**55.5**	**55.5**	51.9	50.2	48.3	46.3	44.1	41.8	39.4	37.2	35.0	32.9	31.1	
$M_{c.z.Rd}$ = 17.8	0.6	**55.5**	**55.5**	**55.5**	52.6	51.5	50.4	49.3	48.2	47.0	45.8	44.5	43.2	42.0	
Class 3	0.4	**55.5**	**55.5**	**55.5**	**55.5**	**55.5**	**55.5**	52.8	52.3	51.8	51.3	50.8	50.3	49.8	
152x152x30	1.0	**83.7**	78.7	75.3	71.5	67.2	62.6	58.0	53.6	49.5	45.8	42.5	39.6	37.1	1748
$M_{c.y.Rd}$ = 83.7	0.8	**83.7**	**83.7**	78.4	76.0	73.5	70.9	68.1	65.2	62.2	59.3	56.4	53.6	51.0	
$M_{c.z.Rd}$ = 37.7	0.6	**83.7**	**83.7**	**83.7**	79.5	78.1	76.7	75.2	73.8	72.3	70.8	69.3	67.7	66.1	
Class 1	0.4	**83.7**	**83.7**	**83.7**	**83.7**	**83.7**	**83.7**	**83.7**	79.4	78.8	78.2	77.5	76.9	76.3	
152x152x37	1.0	**104**	98.5	94.8	90.8	86.5	81.8	77.1	72.4	67.9	63.6	59.7	56.2	52.9	2210
$M_{c.y.Rd}$ = 104	0.8	**104**	**104**	98.4	95.8	93.2	90.6	87.8	84.9	82.0	79.0	76.0	73.1	70.2	
$M_{c.z.Rd}$ = 47.2	0.6	**104**	**104**	**104**	**104**	98.2	96.7	95.3	93.8	92.4	90.9	89.4	87.9	86.3	
Class 1	0.4	**104**	**104**	**104**	**104**	**104**	**104**	**104**	**104**	99.2	98.6	97.9	97.3	96.7	
203x203x46	1.0	**152**	**152**	144	139	135	129	124	118	111	105	98.8	93.0	87.6	4568
$M_{c.y.Rd}$ = 152	0.8	**152**	**152**	**152**	144	141	138	134	131	127	123	119	115	111	
$M_{c.z.Rd}$ = 51.4	0.6	**152**	**152**	**152**	**152**	**152**	144	142	140	138	136	134	132	130	
Class 3	0.4	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	144	144	143	
203x203x52	1.0	**192**	**192**	180	175	169	162	155	147	139	131	124	117	110	5259
$M_{c.y.Rd}$ = 192	0.8	**192**	**192**	**192**	181	177	173	169	164	160	155	150	145	140	
$M_{c.z.Rd}$ = 89.3	0.6	**192**	**192**	**192**	**192**	**192**	182	179	177	174	172	169	167	164	
Class 2	0.4	**192**	**192**	**192**	**192**	**192**	**192**	**192**	**192**	**192**	**192**	182	181	180	
203x203x60	1.0	**222**	**222**	209	203	197	190	182	175	167	159	151	143	136	6125
$M_{c.y.Rd}$ = 222	0.8	**222**	**222**	**222**	210	206	202	197	193	188	183	179	174	168	
$M_{c.z.Rd}$ = 103	0.6	**222**	**222**	**222**	**222**	**222**	211	208	206	203	201	198	196	193	
Class 1	0.4	**222**	**222**	**222**	**222**	**222**	**222**	**222**	**222**	**222**	**222**	**222**	211	210	
203x203x71	1.0	**270**	**270**	256	249	242	235	228	220	212	204	196	188	180	7618
$M_{c.y.Rd}$ = 270	0.8	**270**	**270**	**270**	257	253	248	244	239	234	230	225	220	215	
$M_{c.z.Rd}$ = 126	0.6	**270**	**270**	**270**	**270**	**270**	**270**	255	253	250	248	245	243	240	
Class 1	0.4	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	
203x203x86	1.0	**330**	**330**	314	307	300	293	285	277	270	261	253	245	237	9449
$M_{c.y.Rd}$ = 330	0.8	**330**	**330**	**330**	**330**	311	306	302	297	293	288	283	278	273	
$M_{c.z.Rd}$ = 154	0.6	**330**	**330**	**330**	**330**	**330**	**330**	**330**	312	309	307	304	302	299	
Class 1	0.4	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	**330**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
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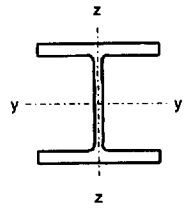
BENDING

UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
254x254x73	1.0	**304**	**304**	**304**	287	280	273	265	257	248	239	229	219	209	11410
$M_{c.y.Rd}$ = 304	0.8	**304**	**304**	**304**	**304**	289	284	279	274	269	264	258	252	246	
$M_{c.z.Rd}$ = 104	0.6	**304**	**304**	**304**	**304**	**304**	**304**	**304**	287	284	281	278	275	272	
Class 3	0.4	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	**304**	
254x254x89	1.0	**414**	**414**	**414**	390	381	371	361	350	339	327	315	302	290	14270
$M_{c.y.Rd}$ = 414	0.8	**414**	**414**	**414**	**414**	393	387	381	374	367	360	353	346	338	
$M_{c.z.Rd}$ = 195	0.6	**414**	**414**	**414**	**414**	**414**	**414**	**414**	392	388	384	380	377	373	
Class 1	0.4	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	**414**	
254x254x107	1.0	**502**	**502**	**502**	475	465	455	444	433	421	409	397	385	372	17510
$M_{c.y.Rd}$ = 502	0.8	**502**	**502**	**502**	**502**	**502**	472	465	458	452	445	437	430	423	
$M_{c.z.Rd}$ = 236	0.6	**502**	**502**	**502**	**502**	**502**	**502**	**502**	478	474	470	466	462	458	
Class 1	0.4	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	**502**	
254x254x132	1.0	**632**	**632**	**632**	601	590	579	568	557	545	533	521	509	496	22530
$M_{c.y.Rd}$ = 632	0.8	**632**	**632**	**632**	**632**	**632**	599	592	584	577	570	563	556	549	
$M_{c.z.Rd}$ = 297	0.6	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	602	598	594	590	586	
Class 1	0.4	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	**632**	
254x254x167	1.0	**819**	**819**	**819**	**819**	772	760	749	737	725	713	701	689	676	30000
$M_{c.y.Rd}$ = 819	0.8	**819**	**819**	**819**	**819**	**819**	**819**	775	767	760	752	745	738	730	
$M_{c.z.Rd}$ = 385	0.6	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	779	774	770	
Class 1	0.4	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	**819**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
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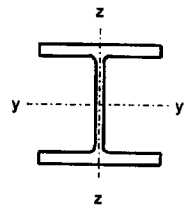
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.

BENDING

UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
305x305x97	1.0	**489**	461	441	419	393	364	335	306	281	258	238	221	206	22250
$M_{c.y.Rd}$ = 489	0.8	**489**	**489**	459	445	429	413	395	376	357	338	320	302	286	
$M_{c.z.Rd}$ = 162	0.6	**489**	**489**	**489**	465	456	447	438	429	419	409	399	389	378	
Class 3	0.4	**489**	**489**	**489**	**489**	**489**	**489**	**489**	463	459	454	450	446	442	
305x305x118	1.0	**662**	622	596	566	532	496	459	424	391	362	336	313	293	27670
$M_{c.y.Rd}$ = 662	0.8	**662**	**662**	620	602	582	561	539	515	492	468	446	424	403	
$M_{c.z.Rd}$ = 303	0.6	**662**	**662**	**662**	629	618	606	595	583	572	560	548	535	522	
Class 2	0.4	**662**	**662**	**662**	**662**	**662**	**662**	**662**	628	623	618	613	608	603	
305x305x137	1.0	**776**	732	704	673	638	602	564	527	492	459	430	403	379	32810
$M_{c.y.Rd}$ = 776	0.8	**776**	**776**	731	711	691	670	647	624	601	577	554	531	508	
$M_{c.z.Rd}$ = 356	0.6	**776**	**776**	**776**	**776**	729	717	706	694	683	671	659	647	634	
Class 1	0.4	**776**	**776**	**776**	**776**	**776**	**776**	**776**	**776**	736	731	726	721	716	
305x305x158	1.0	**906**	858	827	795	760	724	686	648	611	575	542	512	484	38750
$M_{c.y.Rd}$ = 906	0.8	**906**	**906**	857	836	815	794	772	749	726	702	679	655	632	
$M_{c.z.Rd}$ = 416	0.6	**906**	**906**	**906**	**906**	856	844	832	821	809	797	785	773	761	
Class 1	0.4	**906**	**906**	**906**	**906**	**906**	**906**	**906**	**906**	**906**	859	854	849	844	
305x305x198	1.0	**1160**	1110	1070	1040	1000	968	931	892	854	815	778	742	708	50900
$M_{c.y.Rd}$ = 1160	0.8	**1160**	**1160**	1110	1080	1060	1040	1020	998	975	952	928	904	880	
$M_{c.z.Rd}$ = 534	0.6	**1160**	**1160**	**1160**	**1160**	**1160**	1100	1080	1070	1060	1050	1040	1020	1010	
Class 1	0.4	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	**1160**	1100	1100	
305x305x240	1.0	**1440**	**1440**	1340	1300	1270	1230	1190	1160	1120	1080	1040	999	961	64200
$M_{c.y.Rd}$ = 1440	0.8	**1440**	**1440**	**1440**	1350	1330	1310	1280	1260	1240	1220	1190	1170	1150	
$M_{c.z.Rd}$ = 659	0.6	**1440**	**1440**	**1440**	**1440**	**1440**	1370	1350	1340	1330	1320	1300	1290	1280	
Class 1	0.4	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	**1440**	
305x305x283	1.0	**1730**	**1730**	1620	1580	1550	1510	1470	1440	1400	1360	1320	1280	1240	78870
$M_{c.y.Rd}$ = 1730	0.8	**1730**	**1730**	**1730**	1640	1610	1590	1570	1540	1520	1500	1480	1450	1430	
$M_{c.z.Rd}$ = 792	0.6	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	1640	1630	1610	1600	1590	1580	1560	
Class 1	0.4	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	**1730**	
356x368x129	1.0	**765**	**765**	713	687	657	622	585	546	507	470	437	406	379	40250
$M_{c.y.Rd}$ = 765	0.8	**765**	**765**	**765**	716	697	677	655	632	608	582	557	531	506	
$M_{c.z.Rd}$ = 268	0.6	**765**	**765**	**765**	**765**	728	716	705	693	680	668	655	642	628	
Class 3	0.4	**765**	**765**	**765**	**765**	**765**	**765**	**765**	**765**	729	723	718	712	707	
356x368x153	1.0	**1000**	**1000**	930	896	856	813	766	717	669	624	582	544	509	48590
$M_{c.y.Rd}$ = 1000	0.8	**1000**	**1000**	**1000**	935	911	885	858	829	799	768	737	706	675	
$M_{c.z.Rd}$ = 485	0.6	**1000**	**1000**	**1000**	**1000**	952	937	923	908	893	877	862	846	830	
Class 2	0.4	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	948	942	935	928	
356x368x177	1.0	**1170**	**1170**	1090	1050	1010	965	917	868	818	770	724	682	643	57120
$M_{c.y.Rd}$ = 1170	0.8	**1170**	**1170**	**1170**	1090	1070	1040	1010	985	955	925	893	862	831	
$M_{c.z.Rd}$ = 565	0.6	**1170**	**1170**	**1170**	**1170**	**1170**	1100	1080	1070	1050	1040	1020	1010	990	
Class 1	0.4	**1170**	**1170**	**1170**	**1170**	**1170**	**1170**	**1170**	**1170**	**1170**	1110	1100	1100	1090	
356x368x202	1.0	**1340**	**1340**	1250	1220	1170	1130	1080	1030	979	930	881	836	793	66260
$M_{c.y.Rd}$ = 1340	0.8	**1340**	**1340**	**1340**	1260	1240	1210	1180	1150	1120	1090	1060	1030	997	
$M_{c.z.Rd}$ = 649	0.6	**1340**	**1340**	**1340**	**1340**	**1340**	1270	1250	1240	1220	1210	1190	1180	1160	
Class 1	0.4	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	**1340**	1280	1270	1260	

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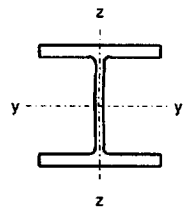
BENDING

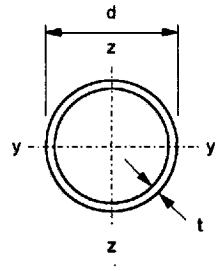
UC SECTIONS SUBJECT TO BENDING



DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Designation Cross section resistance (kNm) Classification	η (1)	Design (UK) buckling resistance moment of a member $M_{b.Rd}$ (kNm) for slenderness correction factors η Spacing between lateral restraints in metres													Second Moment of Area y-y Axis I_y cm^4
		2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	
356x406x235	1.0	**1580**	**1580**	1490	1450	1410	1370	1320	1270	1220	1170	1120	1070	1020	79080
$M_{c.y.Rd}$ = 1580	0.8	**1580**	**1580**	**1580**	1500	1470	1450	1420	1390	1360	1330	1300	1270	1240	
$M_{c.z.Rd}$ = 806	0.6	**1580**	**1580**	**1580**	**1580**	**1580**	1510	1490	1480	1460	1450	1430	1420	1400	
Class 1	0.4	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	**1580**	1500	
356x406x287	1.0	**1970**	**1970**	1860	1820	1770	1730	1680	1630	1580	1530	1480	1430	1380	99880
$M_{c.y.Rd}$ = 1970	0.8	**1970**	**1970**	**1970**	**1970**	1840	1820	1790	1760	1730	1700	1670	1640	1610	
$M_{c.z.Rd}$ = 997	0.6	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	1870	1850	1830	1820	1800	1790	1770	
Class 1	0.4	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	**1970**	
356x406x340	1.0	**2370**	**2370**	2250	2210	2160	2110	2070	2020	1970	1920	1870	1820	1760	122500
$M_{c.y.Rd}$ = 2370	0.8	**2370**	**2370**	**2370**	**2370**	2240	2210	2180	2150	2120	2090	2060	2030	2000	
$M_{c.z.Rd}$ = 1200	0.6	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	2250	2230	2210	2200	2180	2160	
Class 1	0.4	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	**2370**	
356x406x393	1.0	**2780**	**2780**	**2780**	2610	2560	2510	2470	2420	2370	2320	2270	2220	2160	146600
$M_{c.y.Rd}$ = 2780	0.8	**2780**	**2780**	**2780**	**2780**	2640	2610	2580	2550	2520	2490	2460	2430	2400	
$M_{c.z.Rd}$ = 1400	0.6	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	2640	2620	2600	2590	2570	
Class 1	0.4	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	**2780**	
356x406x467	1.0	**3380**	**3380**	**3380**	3200	3150	3100	3050	3000	2950	2900	2850	2800	2740	183000
$M_{c.y.Rd}$ = 3380	0.8	**3380**	**3380**	**3380**	**3380**	**3380**	3200	3170	3140	3110	3080	3050	3020	2990	
$M_{c.z.Rd}$ = 1700	0.6	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	3220	3200	3180	3160	
Class 1	0.4	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	**3380**	
356x406x551	1.0	**3850**	**3850**	**3850**	**3850**	3630	3580	3540	3490	3450	3400	3360	3310	3270	226900
$M_{c.y.Rd}$ = 3850	0.8	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	3660	3630	3600	3570	3540	3510	3480	
$M_{c.z.Rd}$ = 1930	0.6	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	3670	3650	
Class 1	0.4	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	**3850**	
356x406x634	1.0	**4540**	**4540**	**4540**	**4540**	4310	4260	4210	4160	4120	4070	4020	3980	3930	274800
$M_{c.y.Rd}$ = 4540	0.8	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	4300	4270	4240	4210	4190	4160	
$M_{c.z.Rd}$ = 2270	0.6	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	
Class 1	0.4	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	**4540**	

y - y is the major axis and z - z is the minor axis.
Classification is for bending about y - y axis.
(1) Slenderness correction factor: $\eta = (k/C_1)^{0.5}$ k: Effective length factor C_1: Factor to allow for shape of bending moment diagram.
Bold values are those equal to $M_{c.y.Rd}$ (i.e. resistance moment of the cross section about y - y axis).
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.3.



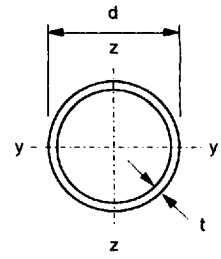
BENDING

CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
21.3	3.2 Δ	1.43	0.358	1	0.768
26.9	3.2 Δ	1.87	0.611	1	1.70
33.7	2.6 Δ	1.99	0.852	1	3.09
	3.2 Δ	2.41	1.01	1	3.60
	4.0 Δ	2.93	1.20	1	4.19
42.4	2.6 Δ	2.55	1.39	1	6.46
	3.2 Δ	3.09	1.67	1	7.62
	4.0 Δ	3.79	2.00	1	8.99
48.3	3.2	3.56	2.20	1	11.6
	4.0	4.37	2.66	1	13.8
	5.0	5.34	3.18	1	16.2
60.3	3.2	4.51	3.53	1	23.5
	4.0	5.55	4.29	1	28.2
	5.0	6.82	5.18	1	33.5
76.1	3.2	5.75	5.75	1	48.8
	4.0	7.11	7.04	1	59.1
	5.0	8.77	8.56	1	70.9
88.9	3.2	6.76	7.95	1	79.2
	4.0	8.38	9.76	1	96.3
	5.0	10.3	11.9	1	116
114.3	3.6	9.83	14.9	1	192
	5.0	13.5	20.2	1	257
	6.3	16.8	24.9	1	313
139.7	5.0	16.6	30.7	1	481
	6.3	20.7	37.9	1	589
	8.0	26.0	47.0	1	720
	10.0	32.0	57.0	1	862

Δ Sections marked thus are normally available in grade 275 only.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

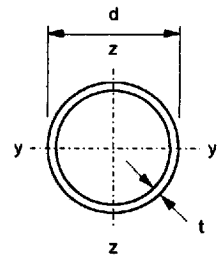
DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
168.3	5.0	20.1	45.1	2	856
	6.3	25.2	55.9	1	1053
	8.0	31.6	69.6	1	1297
	10.0	39.0	84.8	1	1564
193.7	5.0	23.3	60.2	2	1320
	6.3	29.1	74.8	1	1630
	8.0	36.6	93.3	1	2016
	10.0	45.3	114	1	2442
	12.5	55.9	139	1	2934
	16.0 ♦	70.1	171	1	3554
219.1	5.0	26.4	77.5	2	1928
	6.3	33.1	96.5	2	2386
	8.0	41.6	121	1	2960
	10.0	51.6	148	1	3598
	12.5	63.7	181	1	4345
	16.0	80.1	224	1	5297
	20.0 ♦	98.2	269	1	6261
244.5	6.3	37.0	121	2	3346
	8.0	46.7	151	1	4160
	10.0	57.8	186	1	5073
	12.5	71.5	228	1	6147
	16.0	90.2	283	1	7533
	20.0 ♦	111	342	1	8957
	25.0 † ♦	135	409	1	10520
273.0	6.3	41.4	152	2	4696
	8.0	52.3	190	2	5852
	10.0	64.9	234	1	7154
	12.5	80.3	287	1	8697
	16.0	101	358	1	10710
	20.0 ♦	125	434	1	12800
	25.0 ♦	153	522	1	15130

† Sections marked thus are not included in BS4848: Part 2.

♦ Check availability of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

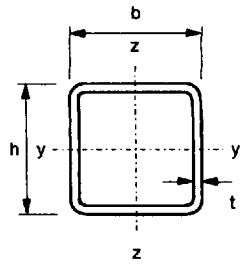
CIRCULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Outside Diameter d mm	Thickness t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
323.9	6.3	49.3	166	3	7929
	8.0	62.3	270	2	9910
	10.0	77.4	333	1	12160
	12.5	96.0	410	1	14850
	16.0	121	513	1	18390
	20.0 ♦	150	625	1	22140
	25.0 ♦	184	757	1	26400
355.6	8.0	68.6	327	2	13200
	10.0	85.2	404	2	16220
	12.5	106	498	1	19850
	16.0	134	624	1	24660
	20.0 ♦	166	762	1	29790
	25.0 ♦	204	926	1	35680
406.4	10.0	97.8	531	2	24480
	12.5	121	656	1	30030
	16.0	154	825	1	37450
	20.0 ♦	191	1010	1	45430
	25.0 ♦	235	1230	1	54700
	32.0 ♦	295	1520	1	66430
457.0	10.0	110	676	2	35090
	12.5	137	835	2	43140
	16.0	174	1050	1	53960
	20.0 ♦	216	1290	1	65680
	25.0 ♦	266	1580	1	79420
	32.0 ♦	335	1960	1	97010
	40.0 ♦	411	2360	1	114900
508.0	10.0	123	646	3	48520
	12.5	153	1040	2	59760
	16.0	194	1310	1	74910
	20.0 ♦	241	1610	1	91430
	25.0 ♦	298	1970	1	110900
	32.0 ♦	376	2460	1	136100
	40.0 ♦	462	2970	1	162200
	50.0 ♦	565	3360	1	190900

♦ Check availability of sections.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



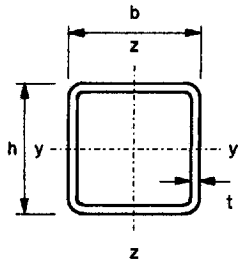
BENDING

SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size	Thickness				
h x b mm.mm	t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
20x20	2.0	1.12	0.322	1	0.759
	2.5	1.35	0.377	1	0.865
25x25	2.0	1.43	0.528	1	1.59
	2.5	1.74	0.628	1	1.85
	3.0	2.04	0.716	1	2.06
	3.2	2.15	0.748	1	2.14
30x30	2.5	2.14	0.943	1	3.40
	3.0	2.51	1.09	1	3.84
	3.2	2.65	1.14	1	4.00
40x40	2.5	2.92	1.76	1	8.67
	3.0	3.45	2.05	1	9.96
	3.2	3.66	2.16	1	10.4
	4.0	4.46	2.57	1	12.1
	5.0	5.40	3.02	1	13.8
50x50	2.5	3.71	2.83	1	17.7
	3.0	4.39	3.32	1	20.5
	3.2	4.66	3.51	1	21.6
	4.0	5.72	4.22	1	25.5
	5.0	6.97	5.03	1	29.6
	6.3	8.49	5.92	1	33.9
60x60	3.0	5.34	4.90	1	36.6
	3.2	5.67	5.18	1	38.7
	4.0	6.97	6.28	1	46.1
	5.0	8.54	7.54	1	54.4
	6.3	10.5	9.00	1	63.4
	8.0	12.8	10.6	1	72.4
70x70	3.0	6.28	6.78	1	59.6
	3.6	7.46	7.97	1	69.5
	5.0	10.1	10.6	1	90.1
	6.3	12.5	12.7	1	106
	8.0	15.3	15.2	1	123
80x80	3.0	7.22	8.96	1	90.6
	3.6	8.59	10.6	1	106
	5.0	11.7	14.1	1	139
	6.3	14.4	17.1	1	165
	8.0	17.8	20.6	1	194
90x90	3.6	9.72	13.5	1	154
	5.0	13.3	18.1	1	202
	6.3	16.4	22.1	1	242
	8.0	20.4	26.8	1	288

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

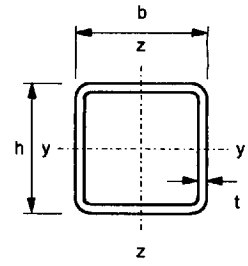
SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size	Thickness				
h x b	t		$M_{c.Rd}$		I
mm.mm	mm	kg/m	kNm		cm^4
100x100	4.0	12.0	18.6	1	234
	5.0	14.8	22.7	1	283
	6.3	18.4	27.7	1	341
	8.0	22.9	33.8	1	408
	10.0	27.9	40.2	1	474
120x120	4.0	14.5	27.1	2	413
	5.0	18.0	33.3	1	503
	6.3	22.3	40.9	1	610
	8.0	27.9	50.2	1	738
	10.0	34.2	60.3	1	870
	12.5	41.6	71.6	1	1009
140x140	5.0 †	21.1	45.9	1	814
	6.3 †	26.3	56.6	1	994
	8.0 †	32.9	69.9	1	1212
	10.0 †	40.4	84.5	1	1441
	12.5 †	49.5	101	1	1691
150x150	5.0	22.7	53.0	2	1009
	6.3	28.3	65.5	1	1236
	8.0	35.4	81.0	1	1510
	10.0	43.6	98.1	1	1803
	12.5	53.4	118	1	2125
	16.0	66.4	142	1	2500
160x160	5.0 †	24.2	60.6	2	1234
	6.0 †	28.9	71.7	1	1450
	6.3 †	30.3	74.9	1	1513
	8.0 †	37.9	92.9	1	1853
	10.0 †	46.7	113	1	2219
	12.5 †	57.3	136	1	2627
180x180	5.0 †	27.4	66.7	3	1777
	6.3	34.2	95.8	1	2186
	8.0	43.0	119	1	2689
	10.0	53.0	145	1	3237
	12.5	65.2	175	1	3856
	16.0	81.4	214	1	4607
200x200	5.0 †	30.5	78.5	4	2460
	6.3	38.2	119	2	3033
	8.0	48.0	148	1	3744
	10.0	59.3	181	1	4525
	12.5	73.0	220	1	5419
	16.0	91.5	270	1	6524
250x250	6.3	48.1	155	4	6049
	8.0	60.5	236	2	7510
	10.0	75.0	290	1	9141
	12.5	92.6	354	1	11050
	16.0	117	439	1	13480

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

SQUARE HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) MOMENT RESISTANCE FOR STEEL GRADE S 355

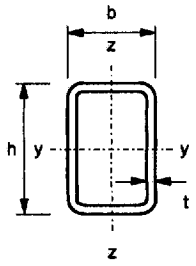
Section Designation		Mass per Metre	Moment Resistance of Cross Section	EC 3 Classification Bending only	Second Moment of Area
Size	Thickness				
h x b mm.mm	t mm	kg/m	$M_{c.Rd}$ kNm		I cm^4
300x300	6.3 †	57.9	210	4	10600
	8.0	73.1	288	4	13210
	10.0	90.7	424	2	16150
	12.5	112	520	1	19630
	16.0	142	648	1	24160
350x350	8.0	85.7	374	4	21240
	10.0	106	503	3	26050
	12.5	132	718	1	31810
	16.0	167	898	1	39370
400x400	10.0	122	628	4	39350
	12.5	152	947	2	48190
	16.0	192	1190	1	59910
	20.0	237	1450	1	72390

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

BENDING

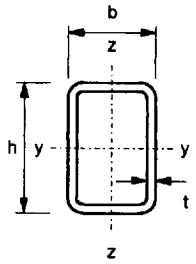
RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING



DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
50x25	2.5	2.72	1.83	1.10	2.67	1	1	10.6
	3.0	3.22	2.13	1.27	2.60	1	1	12.2
	3.2	3.41	2.24	1.34	2.57	1	1	12.8
50x30	2.5	2.92	2.03	1.41	4.08	1	1	12.0
	3.0	3.45	2.37	1.63	4.00	1	1	13.9
	3.2	3.66	2.50	1.72	3.97	1	1	14.5
	4.0	4.46	2.98	2.03	3.84	1	1	17.0
	5.0	5.40	3.50	2.36	3.67	1	1	19.5
60x40	2.5	3.71	3.19	2.40	6.50	1	1	23.1
	3.0	4.39	3.74	2.80	6.41	1	1	26.9
	3.2	4.66	3.95	2.96	6.37	1	1	28.3
	4.0	5.72	4.76	3.55	6.23	1	1	33.6
	5.0	6.97	5.68	4.20	6.04	1	1	39.2
	6.3	8.49	6.72	4.92	5.80	1	1	45.1
80x40	3.0	5.34	5.84	3.55	4.42	1	1	55.0
	3.2	5.67	6.18	3.75	4.39	1	1	58.1
	4.0	6.97	7.50	4.52	4.28	1	1	69.6
	5.0	8.54	9.02	5.38	4.14	1	1	82.4
	6.3	10.5	10.8	6.36	3.95	1	1	96.5
	8.0	12.8	12.8	7.38	3.72	1	1	111
90x50	3.0	6.28	7.92	5.23	6.35	1	2	85.4
	3.6	7.46	9.32	6.13	6.26	1	1	99.8
	5.0	10.1	12.4	8.07	6.04	1	1	130
	6.3	12.5	14.9	9.65	5.84	1	1	154
	8.0	15.3	17.9	11.4	5.58	1	1	180
100x50	3.0	6.75	9.32	5.71	5.63	1	2	111
	3.2	7.18	9.88	6.04	5.60	1	2	117
	4.0	8.86	12.1	7.33	5.49	1	1	142
	5.0	10.9	14.6	8.83	5.35	1	1	170
	6.3	13.4	17.7	10.6	5.16	1	1	202
	8.0	16.6	21.3	12.5	4.92	1	1	238
100x60	3.0	7.22	10.3	7.21	8.50	1	2	125
	3.6	8.59	12.2	8.49	8.40	1	1	147
	5.0	11.7	16.2	11.3	8.17	1	1	192
	6.3	14.4	19.7	13.6	7.95	1	1	230
	8.0	17.8	23.8	16.3	7.67	1	1	272
120x60	3.6	9.72	16.1	9.86	6.76	1	2	230
	5.0	13.3	21.6	13.1	6.56	1	1	304
	6.3	16.4	26.4	15.9	6.37	1	1	366
	8.0	20.4	32.1	19.1	6.13	1	1	437

y - y is the major axis and z - z is the minor axis.
FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
120x80	5.0	14.8	25.5	19.2	13.0	1	1	370
	6.3	18.4	31.2	23.4	12.8	1	1	447
	8.0	22.9	38.1	28.4	12.5	1	1	537
	10.0	27.9	45.4	33.6	12.1	1	1	628
150x100	5.0	18.7	40.7	30.7	16.5	1	2	747
	6.3	23.3	50.2	37.7	16.2	1	1	910
	8.0	29.1	61.8	46.2	15.9	1	1	1106
	10.0	35.7	74.4	55.4	15.6	1	1	1312
	12.5	43.6	88.8	65.6	15.1	1	1	1532
160x80	5.0	18.0	39.6	24.2	8.98	1	2	753
	6.3	22.3	48.8	29.6	8.80	1	1	917
	8.0	27.9	60.0	36.2	8.56	1	1	1113
	10.0	34.2	72.2	43.1	8.27	1	1	1318
	12.5	41.6	85.9	50.6	7.92	1	1	1536
200x100	5.0	22.7	63.0	32.1	11.4	1	4	1509
	6.3	28.3	78.0	47.7	11.2	1	2	1851
	8.0	35.4	96.6	58.7	11.0	1	1	2269
	10.0	43.6	117	70.6	10.7	1	1	2718
	12.5	53.4	141	84.1	10.3	1	1	3218
	16.0	66.4	171	100	9.85	1	1	3808
200x120	5.0 †	24.2	69.6	40.4	17.2	1	4	1699
	6.0 †	28.9	82.4	57.7	17.0	1	2	2000
	6.3 †	30.3	86.2	60.3	16.9	1	2	2087
	8.0 †	37.9	107	74.5	16.7	1	1	2564
	10.0 †	46.7	130	90.1	16.3	1	1	3079
	12.5 †	57.3	157	108	15.9	1	1	3658
200x150	5.0 †	26.6	79.5	53.9	31.1	2	4	1984
	6.3 †	33.2	98.6	80.8	30.8	1	2	2442
	8.0 †	41.7	123	100	30.5	1	1	3006
	10.0 †	51.4	149	122	30.0	1	1	3621
	12.5 †	63.2	181	147	29.5	1	1	4318
	16.0 †	78.9	221	179	28.8	1	1	5166
250x100	6.3 †	33.2	111	47.7	8.97	1	4	3242
	8.0 †	41.7	138	71.1	8.76	1	2	3995
	10.0 †	51.4	168	85.8	8.52	1	1	4818
	12.5 †	63.2	204	103	8.22	1	1	5754
	16.0 †	78.9	249	123	7.80	1	1	6895
250x150	5.0 †	30.5	110	58.1	21.7	2	4	3382
	6.3	38.2	137	79.8	21.4	1	4	4178
	8.0	48.0	171	119	21.2	1	2	5167
	10.0	59.3	209	145	20.8	1	1	6259
	12.5	73.0	254	176	20.4	1	1	7518
	16.0	91.5	312	215	19.8	1	1	9089

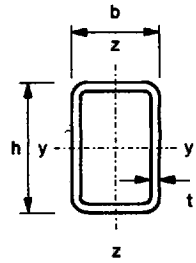
y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.

BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING



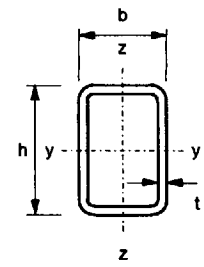
DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
260x140	6.3 †	38.2	140	74.2	17.5	1	4	4392
	8.0 †	48.0	174	113	17.2	1	2	5434
	10.0 †	59.3	213	137	16.9	1	1	6583
	12.5 †	73.0	259	166	16.5	1	1	7909
	16.0 †	91.5	319	202	16.0	1	1	9565
300x100	6.3 †	38.2	149	51.0	7.61	1	4	5162
	8.0 †	48.0	186	70.4	7.42	1	4	6386
	10.0 †	59.3	228	101	7.21	1	2	7738
	12.5 †	73.0	277	121	6.94	1	1	9295
	16.0 †	91.5	341	146	6.57	1	1	11240
300x200	6.3	48.1	212	123	33.6	2	4	7880
	8.0	60.5	265	170	33.3	1	4	9798
	10.0	75.0	326	246	33.0	1	2	11940
	12.5	92.6	399	299	32.5	1	1	14460
	16.0	117	494	370	31.9	1	1	17700
300x250	6.3 †	53.0	198	165	83.5	4	4	9239
	8.0 †	66.8	305	227	67.5	2	4	11500
	10.0 †	82.8	375	331	67.0	1	2	14050
	12.5 †	102	459	404	66.4	1	1	17050
	16.0 †	129	571	502	65.5	1	1	20930
350x150	6.3 †	48.1	230	89.1	14.8	1	4	9551
	8.0 †	60.5	288	125	14.6	1	4	11880
	10.0 †	75.0	353	170	14.3	1	3	14490
	12.5 †	92.6	432	234	14.0	1	1	17560
	16.0 †	117	536	287	13.5	1	1	21500
350x250	8.0 †	73.1	380	240	47.2	2	4	16560
	10.0 †	90.7	468	325	46.8	1	3	20270
	12.5 †	112	575	455	46.3	1	1	24680
	16.0 †	142	717	565	45.6	1	1	30440
400x150	6.3 †	53.0	284	92.1	13.0	2	4	13350
	8.0 †	66.8	356	131	12.8	1	4	16630
	10.0 †	82.8	438	178	12.6	1	4	20340
	12.5 †	102	537	263	12.3	1	2	24720
	16.0 †	129	669	324	11.9	1	1	30400
400x200	6.3 †	57.9	326	133	23.3	2	4	15790
	8.0	73.1	409	188	23.1	1	4	19710
	10.0	90.7	504	257	22.8	1	4	24140
	12.5	112	619	379	22.5	1	2	29410
	16.0	142	772	469	22.0	1	1	36300
400x300	10.0 †	106	636	431	62.2	2	4	31750
	12.5 †	132	783	642	61.6	1	2	38800
	16.0 †	167	980	802	60.9	1	1	48100

y - y is the major axis and z - z is the minor axis.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.



BENDING

RECTANGULAR HOLLOW SECTIONS SUBJECT TO BENDING

DESIGN (UK) COMPRESSION RESISTANCE FOR STEEL GRADE S 355

Section Designation		Mass per Metre	Moment Resistance of Cross Section		Limiting Length	EC 3 Classification Bending only		Second Moment of Area y - y Axis
Size h x b mm.mm	Thickness t mm	kg/m	$M_{c.y.Rd}$ kNm	$M_{c.z.Rd}$ kNm	L_c m	y - y	z - z	I_y cm^4
450x250	8.0 †	85.7	551	259	32.8	2	4	30270
	10.0	106	681	356	32.5	1	4	37180
	12.5	132	838	490	32.1	1	3	45470
	16.0	167	1050	692	31.6	1	1	56420
500x200	8.0 †	85.7	580	200	18.5	2	4	34270
	10.0 †	106	717	277	18.3	1	4	42110
	12.5 †	132	882	378	18.0	1	4	51510
	16.0 †	167	1100	569	17.5	1	2	63930
500x300	10.0	122	882	465	43.3	2	4	54120
	12.5	152	1090	632	42.9	1	4	66360
	16.0	192	1370	955	42.3	1	2	82670
	20.0 ∇	237	1670	1160	41.7	1	1	100100

y - y is the major axis and z - z is the minor axis.

∇ Sections marked thus are normally available in grade S 355 only.

† Sections marked thus are not included in BS4848: Part 2.

FOR EXPLANATION OF TABLE, SEE EXPLANATORY NOTE 4.4.